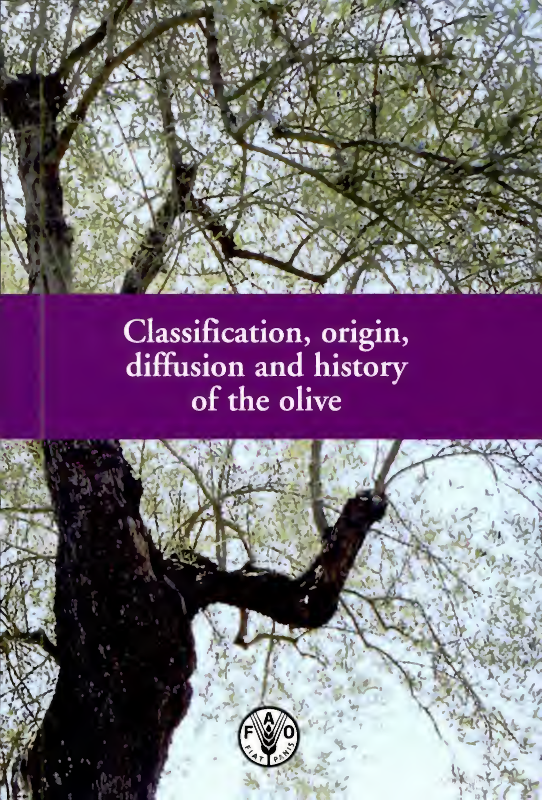

Classification, origin, diffusion and history of the olive

Classification, origin, diffusion and history of the olive

by

Giorgio Bartolini and **Raffaella Petruccelli**
Istituto sulla Propagazione delle Specie Legnose del Consiglio Nazionale delle Ricerche (CNR)
Scandicci, Italy

Technical Editor
H.D. Tindall
Emeritus Professor, Cranfield University, United Kingdom

Technical and Scientific Coordinator
U. G. Menini
Former Chief, Seed and Plant Genetic Resources Service

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Foreword

This book is dedicated to the memory of our late colleague, Dr Umberto Menini, who served FAO for 26 years and was the Chief of the Seed and Plant Genetic Resources Service from 1992 until 2001.

The fact that FAO has undertaken to publish a book of this nature is a reflection not only of Umberto Menini's lifelong passion for the olive plant, but also of his profound understanding of the role of agricultural crops in human culture. This is the final chapter in a long series of studies on olive cultivation promoted by Dr Menini during his career with FAO. His vision and his efforts were instrumental in developing FAO's programme to transfer knowledge and expertise from the Mediterranean region to the service of olive cultivation development in other parts of the world. Indeed, among the countries that were assisted in the development of olive cultivation were China, Pakistan, India, Peru, Nepal, Yemen and Iran. At the same time, serving the countries of the Mediterranean region where olive growing represents a long-lived agricultural tradition, FAO has acted as a promoter and facilitator of information exchange through its support to cooperative projects and networks addressing the multiplicity of issues that shape olive sector modernization strategies, from genetic variability to olive processing technologies.

This review book is intended for scholars and technicians, but also for the culturally curious. The authors principally draw out points of convergence from the wealth of existing scientific literature dealing with the systematic classification of the cultivated olive tree, *Olea europaea* L. After comparing theories about the genetic origins and diversity of the cultivated olive, they have gone on to review not only historical literature and documentation but also religious and esoteric texts in order to trace the multiple lines of humanity's association with this plant and its products – from pre-historical times, through the classical period, and up to the present day.

The classic perennial crop of poorer terrains in the Mediterranean region, the olive has long been one of the cornerstones of subsistence for the rural poor. Now, however, the emerging appeal of its products to the rich is kindling renewed hope of better livelihoods for the producers. In just the last ten years, world olive oil consumption has increased by 55 percent. While much of this growth has occurred in traditional olive growing countries of the Mediterranean region, extra-virgin olive oil has also won worldwide recognition as a speciality food product for which increasing sales – both domestic and export - have made it a textbook case in adding value to primary products.

Olive groves have been beautifying and stabilizing the Mediterranean rural landscape for thousands of years and the presence, as documented in this book, of numerous monumental olive trees that have survived for centuries, even millennia, are a living testimony to the importance of this plant in the past, present, and future of humankind.

I hope that this book will be an inspiration to all those interested in olives, in the Mediterranean and beyond.

Louise O. Fresco
Assistant Director-General
Agriculture Department

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Preface

Together with the fig and date, the olive tree (*Olea europaea* L.) is a plant of the ancient world. Indeed, these species constitute the oldest group of fruit trees in the Mediterranean area (Zohary and Spiegel-Roy, 1975). The olive was one of the first species to be cultivated and, even during the Bronze Age, it represented economic wealth for many Mediterranean societies. This fact can most probably be attributed to the ease with which the species can be propagated asexually, by cuttings: in fact, the first cultivators of the plant did not have any knowledge of sophisticated propagation techniques such as grafting (Zohary and Hopf, 1994).

The cultivation of the olive tree dates back to before 3500 BC. Signs of olive cultivation (i.e., well-preserved carbonized olive stones and charred olive wood; (Zohary and Spiegel-Roy, 1975) appear in Chalcolithic Palestine about 3700-3500 BC. The plant was first mentioned in a description of the oasis of Giove Ammone (Patac *et al.*, 1954). Historically, the olive tree and its principal product, oil, have acquired some rather unique connotations: in fact, they represented the most evident examples of eclectic symbolism among tradition, culture and myth.

A number of authors (Caruso, 1883; Pecori, 1889; Francolini, 1923; Melis, 1948; Chazang-Gilling, 1994) have emphasized various aspects of the culture and history of the olive tree, but a systematic treatment of the subject has been only partially achieved. We therefore considered it appropriate to prepare a compendium on the subject, to include whatever relevant material has been published on the cultural background of the olive during the last one hundred years. At the same time, we have included a series of brief syntheses of its botanical classification and some associated historical aspects, so as to emphasize the important developments which have resulted from the cultivation of this plant. We have also gathered information of an historical nature on the origins and geographical diffusion of the olive tree and linked these with its influence on the civilisations that have developed in the Mediterranean area. We have therefore attempted to introduce some order into this vast and sometimes confusing field of study.

Giorgio Bartolini
Raffaella Petruccelli

The olive has contributed to the development of all the cultures in the Mediterranean Basin. Man has learnt to utilize every part of the plant: the foliage for animal feed, the fruit for table oil and lighting, the wood for fuel. The plant has been embraced by legends (such as that of the founding of Athens) and enshrined in the symbology of major religions – Judaism, Christianity and Islam.

Today the olive is grown in areas with a Mediterranean climate and is, in many cases, of interest in countries that do not have strong economies and whose scientific activity and influence is thus limited. As a result, despite the fact that the plant has been the object of studies over millennia, there are still many aspects of its development that have not been sufficiently explored, and these include the distribution of the species and its taxonomy. We therefore considered it very important to undertake a focused review of such topics in order to provide a foundation for those who may wish to contribute further to the generation of knowledge about this plant.

To set out, as we have done, to enhance the development possibilities of such an ancient plant, and one which is so often characteristic of poorer countries, should not be seen as an anachronistic, or an economically inappropriate, gesture. On the contrary, the challenge today is to increase our understanding of those characteristics of the olive plant which now are no longer secondary, and in this regard we may underline:

- the pharmacological properties (e.g. antioxidants, tocopherols and Vitamin E, etc.) of olive oil and foliar extracts;
- the olive plant's adaptability to environmental stress occurring in marginal areas (tolerance to water stress - needing only 500 mm of annual precipitation, salt tolerance - enabling the use of brackish water, thermal resilience - tolerating temperatures from -15 to +55 degrees C);
- the plant's capacity to provide protection against soil erosion, and particularly for impeding sand movement in desert fringe areas.

The above aspects, combined, constitute a potential resource for the improvement of the socio-economic condition of many peoples living in marginal areas. Its sustainable utilization could enable these peoples to enjoy improved livelihoods, thus also reducing the pressure of rural migration on adjacent regions and in urban centres.

U.G. Menini

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Section I

Classification and origin of *Olea europaea* L.

Chapter 1

Botanical classification

The scientific name of the olive is *Olea europaea* L. The generic epithet *Olea* links it with the Latin name which refers to the olive tree. The specific name, *europaea*, was proposed by Linnaeus (1764), indicating that the olive tree is of European origin and is a typical plant of the Mediterranean area (Several Authors, 1882; Percy and Newberry, 1937). The family *Oleaceae* takes its name from *Olea europaea* L.. Etymologically speaking, the generic name may have been derived from the Greek word *elaion* (oil), that is "a plant that produces oil" (Benigni *et al.*, 1962).

Olea europaea L. is the only species in the *Olea* genus that can be found in the Mediterranean area (Zohary, Hopf, 1994). In fact, when the boundaries of this zone are defined, one is referring to both the natural and/or artificial areas of diffusion of this species which can adapt well to the typical Mediterranean climate (Drude, 1884). This climate is characterized by winter rains, a short-lived cold season, occasional frosts and a dry summer period.

The tree is characterized by whole, oblong or elliptical coriaceous leaves which are generally lanceolate, and grow bilaterally at the same level on the stem. They are grey-green in colour on the upper part of the leaf and silvery on the lower part of the blade. The flowers are small, whitish and are found in an axillary position; the fruit is a succulent drupe of varying dimensions.

Oleaceae: order and family classification

The family *Oleaceae* belongs to the *Magnoliophyta* division. This is the sole family in the order *Oleales* (*Ligustrales*) that belongs to the Dicotyledones sympetalae which, in turn, is subdivided into the subfamilies of *Jasminoideae* and *Oleoideae* (Engler, 1964). Various other authors consider the family to be rather heterogeneous. It has also been included in the order *Gentianales* (Stebbins, 1974), even if it has been ascribed an anomalous embryological structure. According to several authors (Engler, 1964; Dahlgren, 1980; Takhtajan, 1980), it belongs to a unique order, *Oleales*, which is close to the order *Gentianales*. Turnaye and Lawalrée (in: Cronquist, 1981) proposed associating it with the order *Ligustrales*, while Cronquist (1981) included it in the order *Scrophulariales*).

Taxonomy of the olive (Cronquist, 1981)

Class	*Magnoliopsida*
Subclass VI	*Asteridae*
Order 6	*Scrophulariales*
Family	*Oleaceae*
Subfamily	*Oleoideae*
Tribe	*Oleeae*
Genus	*Olea* L.
Species	*Olea europaea* L..
Subspecies	*Olea europaea* L.. subsp. *sativa* Hoffm. et Link (= *O.europaea* L. subsp. *europaea*), *Olea europaea* L. subsp. *oleaster* Hoffm. et Link (= *O.europaea* L. subsp. *sylvestris* Miller)

Earlier classifications of Oleaceae

The first studies on the systematic arrangement of the family were carried out by De Candolle (1884), who proposed a subdivision into 4 tribes, *Chionantheae* and *Oleeae* (with succulent fruits), *Fraxineae* and *Syringeae* (with dry fruits). This classification was followed by many others: among these is Flahault's (1886). He subdivided the family into 3 tribes: *Jasmineae, Salvadoreae* and *Oleeae*, the latter into 3 sub-tribes (*Fraxineae, Oleineae* and *Syringineae*). This classification is the one most used in treatises on olive growing.
In Knoblauch's cytogenetic studies (1891), the family was divided into 2 tribes: *Jasmineae* (5 sub-tribes, *Jasminineae, Fontanesineae, Forsythineae, Schereberineae* and *Myxopyrineae*), and *Oleeae* (3 sub-tribes, *Fraxineae, Oleinae, Syringineae*). Several Authors (1981) divided the family into 2 subfamilies, i.e., *Oleoideae* (2 tribes, *Fraxineae* and *Oleeae*) and *Jasminoideae* (5 tribes, *Jasmineae, Forsythieae, Fontanesieae, Myxopyreae* and *Scherebereae*).

Tribes, sub-tribes and sub-families of *Oleaceae*

De Candolle (1884)	Flahault's (1886)	Knoblauch (1891)	Several Authors (1981)
Tribes	*Tribes* —— Subtribes	*Tribes* —— Subtribes	*Subfamilies* — Tribes
Chionantheae	*Jasmineae*	*Jasmineae* Jasminineae Fontanesineae Forsythineae Schereberineae Myxopyrineae	*Oleoideae* Fraxineae Oleeae
Oleeae	*Salvadoreae*	*Oleeae* Fraxineae Oleineae Syringineae	*Jasminoideae* Jasmineae Forsythieae Fontanesieae Myxopyreae Scherebereae
Fraxineae	*Oleeae* Fraxineae Oleineae Syringineae		
Syringeae			

Twenty genera in Flahault's (1886) and Knoblauch's (1891), 10 in Bailey's (1964) classifications; twenty-one in De Candolle's (1883), De Grully and Viala's (1886) and Engler's (1964) have been ascribed to the *Oleaceae* family (Tables 1 and 2).

Recent classifications of Oleaceae

Further studies on the systematic organization of the *Oleaceae* family were subsequently carried out by many scientists (Lingelsheim, 1920; Fiori, 1923-1929; Taylor, 1945; Johnson, 1957; Arlan, 1966; Heywood, 1978; Cronquist, 1981; Pignatti, 1982). Finally, Greuter *et al.* (1989) proposed a more up-to-date classification, particularly for those plants found in the Mediterranean basin (Table 3). This is sometimes referred to as the "Med-list".

The more recent classifications within the family have revised nearly all the first models which, at first glance, may have been considered to be quite similar. This situation was probably due to the limited economic importance of the family: in fact, only the genera *Fraxinus* L. and *Olea* L. are of any economic-agricultural interest.

Several authors have suggested that the family is made up of more than 30 genera. Between 500 to 600 species are estimated to be distributed throughout the temperate and tropical regions (Cronquist, 1981; Rugini and Fedeli, 1990). These genera include ornamental plants as well as those of agricultural interest. The most important of these are *Chionanthus* L., *Fontanesia* Labill., *Forsythia* Vahl., *Fraxinus* L., *Jasminum* L., *Ligustrum* L., *Linociera* Sw., *Noronhia* Stadtman., *Olea* L., *Osmanthus* Lour., *Phillyrea* L. and *Syringa* L., to which most of the species in the family belong (Engler, 1964; Vernon & Heywood, 1982). Table 4 summarizes all the genera ascribed to the family as reported by all the above-mentioned authors.

In 1972, Tutin *et al.* reported that there were 5 genera of *Oleaceae* among the wild-growing Italian flora: *Fraxinus* L., *Jasminum* L., *Ligustrum* L., *Olea* L. and *Phillyrea* L.. Other authors (Fiori, 1923-1929; Zangheri, 1976; Pignatti, 1982) have claimed that there are 8 genera: *Fontanesia* Labill., *Forsythia* L., *Fraxinus* L., *Jasminum* L., *Ligustrum* L., *Olea* L., *Phillyrea* L. and *Syringa* L..

Many plants in the family have medicinal properties including *Olea europaea* L., *Chionanthus virginiana* L., *Syringa vulgaris* L., *Fraxinus ornus* L., *Fraxinus excelsior* L. and *Phillyrea angustifolia* L. These plants occur in various forms: shrubby (*Ligustrum* L., *Syringa* L.), lianose (*Jasminum* L.) or predominantly arboreal (*Fraxinus* L., *Olea* L.).

Chromosome morphology

The haploid chromosome number (n) for the different genera was reported in a cyto-taxonomic study on the *Oleaceae* family by Taylor (1945). According to this study, n = 11 in *Menodora* Humb. et Bonpl.; n=13 in *Fontanesia* Labill and *Jasminum* L.; n = 14 in *Forsythia* L. and n = 23 in *Chionanthus* L., *Fraxinus* L., *Forestiera* Poir., *Ligustrum* L., *Olea* L., *Osmanthus* Lour., *Phillyrea* L., and *Syringa* L.. Sax and Abbe (1932) and Taylor (1945) concluded that the group which is characterized by n = 23 was rather homogeneous, and the morphology of the chromosomes was similar to or identical with the species belonging to the different genera. These genera were also shown to be phylogenetically related to each other (Maekawa, 1962).

Classification of the genus *Olea* L.

Included in this genus are species of evergreen trees and bushes that are found in the warmest zones of Europe, most of Africa, Australia and New Zealand (Fiori, 1923-1929; Verdoom, 1956; Engler, 1964; Cronquist, 1981; Zohary and Hopf, 1994).

The first published authors on the subject (De Candolle, 1884; Knoblauch, 1891) worked on the classification of the genus (Tables 5 and 6). Both authors subdivided the genus into two sections. Ciferri (1942) found that the *Olea* genus was distributed over three geographic areas (Afro-Mediterranean area, Indochina-Malaysia, Natal-Madagascar) (Table 7).

Ciferri (1950) stated that, from a geographical point of view, where the Mediterranean is the fixed point, the *Olea* genus may be divided into two sectors: the eastern one, which is characterized by an ancestral form that has small drupes, and the other which developed further to the west and has large drupes.

Following the *Index Kewensis* (1895-1990), Table 8 summarizes the species of the genus *Olea* that have been described throughout the world. Ciferri (1942) and Caruso (1883) had distributed them in geographic terms (Tables 7 and 9).

Pollen morphology

Nilson (1988) examined the pollen morphology of 17 species representative of the genus *Olea*. According to the author, the specimens examined could be grouped into 3 arbitrary groups with reference to the maximum size of the lumina.

- Group 1 (lumina < 1 mm): *O.brachiata* (Lour.) Merr., *O.dentata* Wall., *O.oblanceolata* Craib., *O.polygama* Wight., *O.rosea* Craib. and *O.welwitschii* Knobl..
- Group 2 (lumina 1.5-2 mm): *O.africana* Miller (Hughes 269), *O.capensis* L. subsp.*enervius* Verd., *O.cuspidata* Wall. (Carter 292), *O.decussata* Kiew, *O.europaea* L. var. *cerasiformis* Webb. et Bert., *O.europaea* L. var. *sativa* Lehr. (Meyers, Dinsmore B4008), *O.hochstetteri* Baker. and *O.paniculata* R.Br..
- Group 3 (lumina > 2 mm): *O.africana* Miller (Ash 404), *O.cuspidata* Wall.p.p., *O.europaea* L., *O.europaea* L. var. *maderensis* Lowe, *O.europaea* L. var. *sativa* Lehr. (Newberry 13), *O.europaea* L. var. *sylvestris* Miller, *O.kilimandscharica* Knobl. and *O.laperrini* Batt. et Trab..

Forms and synonyms within the genus Olea

A critical analysis was recently made of the forms known to belong to the *Olea* genus. Using comparative analyses of the morpho-biometrical characteristics and the synonymity reported in the literature, the forms, cycles and heterotypical synonyms of the species of the genus found in Africa (Mazzolani and Altamura Betti, 1978, 1979, 1980, 1981), Asia (Altamura *et al.*, 1987) and Oceania (Altamura *et al.*, 1985) were defined. In particular, Mazzolani and Altamura Betti, (1978, 1979, 1980, 1981), defined two "cycles of forms" which rotate around two species: *O.chrysophylla* Lam. and *O.capensis* L. These are considered archetypes or aggregate species (Davis and Heywood, 1963) and occur predominantly on the African continent although they are occasionally found in some regions of Asia. Considerable morphological homogeneity was found among the forms examined. The differences observed were ascribed to the environmental variations which exist in such a vast territory that incorporates two continents. According to Davis and Heywood (1963), this can be said to demonstrate the existence of "cycles of forms".

Forms and synonyms of the species Olea chrysophylla Lam.

Mazzolani and Altamura Betti (1978, 1979) examined species for the cycle of *O.chrysophylla*, in which there is a prevalence of forms with narrower, linear-lanceolate leaves. These are found primarily in Africa and, to a lesser extent, in Asia:

Species related to *O.chrysophylla* Lam.

O.africana Miller
O.asiatica Desf.
O.aucheri Ehrend.
O.chrysophylla Lam.
O.chrysophylla Lam. var.*albida* Chev.
O.chrysophylla Lam. var.*aucheri* Chev.
O.chrysophylla Lam. var.*ferruginea* Chev.
O.chrysophylla Lam. var.*maderensis* Chev.
O.chrysophylla Lam. var.*mandoni* Chev.
O.chrysophylla Lam. var.*nubica* Chev.
O.chrysophylla Lam. var.*verrucosa* Chev.
O.cuspidata Wall.
O.europaea Thunb.
O.europaea L. var.*buxifolia* Aiton
O.europaea L. var.*ferruginea* Aiton
O.europaea L. var.*ferruginea* Royle
O.europaea L.. var.*buxifolia* Lowe
O.europaea L. var.*cerasiformis* Webb. Et Berth.
O.europaea L.. subsp.*laperrini* var.*cyrenaica* Cif.
O.europaea L. subsp.*laperrini* var.*maireana* Cif.
O.europaea L. subsp.*laperrini* var.*typica* Cif.
O.europaea L. var. a *verrucosa* Roem. et Schultes
O.europaea L. var.*canariensis* Willd.
O.europaea L. var.*maderensis* Lowe
O.europaea L. var.*nubica* Bak.
O.europaea L. var.*verrucosa* Willd.
O.exasperata Jacq.
O.exasperata Jacq. var. E. Mey.sec DC.
O.exasperata Willd.
O.excelsa Aiton

O.ferruginea Hort. ex Steud.
O.ferruginea Royle
O.guineënsis Hutch. et Smith
O.hochstetteri Bak.
O.hochstetteri Chev.
O.humilis Eckl.
O.kilimandscharica Knobl.
O.lancea Lam.
O.laperrini Batt. et Trab.
O.laurifolia Hoch. ex Bak
O.listeriana Sim.
O.mackenii Harv.
O.monticola Gdgr.
O.Mussolinii Chiov.
O.neriifolia Li
O.notelaea excelsa (Aiton) Webb
O.notelaea excelsa Webb. et Berth.
O.sativa var. Hoffmsgg ex Steud.
O.sativa var. Hoffm. et Link
O.sativa var. a *verrucosa* Rom.et Schultes
O.sativa var.*verrucosa* Willd. sec. DC.
O.schimperi Gdgr
O.schliebenii Knobl.
O.similis Burch
O.somaliensis Bak.
O.subtrinervata Chiov.
O.verrucosa Link
O.verrucosa Pers.sec.DC.
O.verrucosa Link var.*β' brachybotrys* DC.
O.woodiana Knobl.

Accordingly, forty-one forms may be heterotypical synonyms, while *O.excelsa* Aiton, *O.hochstetteri* Chev., *O.hochstetteri* Bak., *O.kilimandscharica* Knobl., *O.laurifolia* Hoch. and *O.Mussolinii* Chiov. may be related species, despite the fact that they have morphological similarities with *O.chrysophylla* Lam..

Taxonomic synonymity between *O.excelsa* Aiton and *O.exasperata* Jacq., *O.exasperata* Wild., *O.humilis* Eckl., *O.lancea* Lam., *O.sativa var.* Hoff ex Stend. and *O.verrucosa* Pers. DC., and between *O.hochstetteri* Chev. and *O.guineënsis* Hutch. Smith have also been determined (Mazzolani and Altamura Betti, 1979).

Green and Kupicha (1979) described a new specie *O.chimanimani* Kup. but Mazzolani and Altamura Betti (1981) believed *O.chimanimani* Kup. was similar to *O.lancea* Lam. and *O.exasperata* Jacq. and probably related to *O.chrysophylla* Lam..

Forms and synonyms of the species Olea capensis L.

Mazzolani and Altamura Betti (1980, 1981) examined 36 forms of the *O.capensis* L. cycle, which are characterized by wide, oblong-elliptical leaves with an obtuse apex and a cuneate base. These are mostly found on the African continent:

Species related to *O.capensis* L.

Ligustrum capense var. *sempervirens* Dill.
O.ambrensis H.Perrier
O.buxifolia Miller
O.capensis L var. *coriacea* Aiton
O.capensis L var. *undulata* Aiton
O.capensis L.
O.capensis L. subsp. *capensis* Verd.
O.capensis L. subsp. *enervis* Verd.
O.capensis L. subsp. *macrocarpa* Verd.
O.cernua Vahl
O.concolor E.Mey.
O.emarginata Lam.
O.emarginata Vahl
O.enervis Harv.
O.foveolata E.Mey.
O.intermedia Tausch
O.laurifolia Lam.
O.laurifolia var. *concolor* Harv.
O.macrocarpa Wright
O.macrophylla Bak.
O.madagascariensis Boiv.
O.mildbraedii Knobl.
O.mildbraedii var. *cuspidata* Knobl.
O.mildbraedii var. *lanceolata* Knobl.
O.mildbraedii var. *typica* Knobl.
O.obovata Bak.
O.obtusifolia Lam.
O.pegleri Wright
O.perrieri Chev.
O.pervilleana Knobl.
O.undulata Jacq.
O.undulata Jacq. var. *planifolia* E.Mey.
O.urophylla Gilg et Schellenb.
O.welwitschii Gilg et Schellenb.
Sideroxylum foliis oblongis integris Burm.
Sideroxylum foliis subrotundis integris Burm.

Further studies on species and taxonomic synonyms that are related to *O.capensis* L. (aggregated species), e.g. *O.ambrensis* Perrier, *O.foveolata* E.Mey., *O.macrophylla* Bak., *O.madascariensis* Boiv., *O.mildbraedii* Knobl., *O.obovata* Bak., *O.pegleri* Wright., *O.perrieri* Chev., *O.pervilleana* Knobl., *O.urophylla* Gilg et Schell., and *O.welwitschii* Gilg et Schell., led Mazzolani and Altamura Betti (1980, 1981) to the conclusion that 25 out of the 36 forms examined were heterotypical synonyms:

Species related to *Olea capensis* L.

	Synonyms
Olea ambrensis Perrier	
Olea foveolata E.Mey.	*Linociera foveolata* (E.Mey.) Knobl. *Linociera foveolata* (E.Mey.) Knobl. subsp.*foveolata* Verdoorn, *Linociera foveolata* (E.Mey.) Knobl. subsp.*major* Verdoorn, *Linociera foveolata* (E.Mey.) Knobl. subsp.*tomentella* Verdoorn, *Linociera marlothii* Knobl.
Olea macrophylla Bak.	
Olea madascariensis Boiv.	
Olea mildbraedii Knobl.	*Campanolea mildbraedii* Gilg et Schell., *Linociera giordani* Chiov., *Linociera latipetala* Taylor, *O.mildbraedii* var.*cuspidata* Knobl., *O.mildbraedii* var.*lanceolata* Knobl., *O.mildbraedii* var.*typica* Knobl.
Olea obovata Bak.	
Olea pegleri Wright.	*Linociera pegleri* Gilg et Schellenb.
Olea perrieri Chev.	
Olea pervilleana Knobl.	
Olea urophylla Gilg et Schellenb.	
Olea welwitschii Gilg et Schellenb.	*Linociera welwitschii* Bak., *Linociera welwitschii* Knobl., *Mayepea welwitschii* Knobl., *Osmanthus welwitschii* Knobl., *Steganthus welwitschii* Knobl.

These studies opened up new avenues of knowledge, and reconfirmed what had been reported previously in the literature. In earlier studies (Chevalier, 1948; Verdoorn, 1956), *O.cuspidata* Wall., *O.ferruginea* Royle, *O.monticola* Gdgr., *O.somaliensis* Baker, and *O.schimperi* Gdgr. had been considered synonyms of *O.chrysophylla* Lam.; *O.capensis* L. subsp. *enervis* Verd., *O.laurifolia* Lam. and *O.macrocarpa* Wright had, in fact, been ascribed to the cycle of *O.capensis* L..

Olea species in Oceania and Asia

Altamura *et al.* (1985, 1987) extended their work to the taxa which had been ascribed to the genus *Olea* and allied genera. They examined 79 taxa present in Oceania known in the literature as taxa of the genus *Olea* and allied genera: *Chionanthus, Nestegis* and *Notelaea*. The only species presently in Oceania which can be ascribed to the genus *Olea* is *O.paniculata* R.Br. Some of its salient morphological characteristics (terminal and axillary inflorescences and the presence of lepidote scales) confirm the hypothesis that this species is closely related to some African species (Kiew and Ibrahim, 1982). Altamura *et al.* (1985) on the basis of the comparison with *O.chrysophylla* Lam. hypothesized a direct relationship between *O.paniculata* R.Br. with *O.chrysophylla* (aggregate species).

In further studies, Altamura *et al.* (1987) examined 149 taxa present in Asia ascribed to the genus *Olea*. Only 26 species were confirmed as belonging to the genus:

Species

O.borneensis Boerlage
O.bournei Fyson
O.brachiata (Lour) Merrill
O.brevipes Chia
O.decussata (Heine) Kiew
O.densiflora Li
O.dentata Wall.
O.depauperata Steud.
O.dioica Roxb.
O.gardneri Thw.
O.glandulifera Wall.
O.graciliflora Koord. et Valet.
O.hainanensis Li

Species

O.heyneana Wall.
O.javanica (Bl) Knobl.
O.laxiflora Li
O.maritima Wall.
O.oblanceolata Craib.
O.paniculata R.Br.
O.penangiana Ridley
O.polygama Wight
O.rosea Craib.
O.salicifolia Wall.
O.sinica Chun
O.wightiana Wall.
O.yuennanensis Hand.- Mzt.

The other forms were attributed to 3 other genera, i.e., *Chionanthus* L, *Ligustrum* L and *Osmanthus* Lour.. Exclusion from the genus was based on the differences in morphological characteristics and, in particular, on the flowers of the species observed.

The Asiatic forms: *O.burnei* Fyson, *O.glandulifera* Wall., and *O.paniculata* R.Br., were said to be morphologically similar (Altamura *et al.*, 1987), as they are also similar to *O.cuspidata* Wall., a heterotypical synonym of *O.chrysophylla* Lam..

The studies by Mazzolani and Altamura Betti, in 1978, 1979, 1980, 1981; and those by Altamura *et al.*, in 1985, and 1987, confirmed:

a) the presence of cycles within the framework of the species of the genus. Indeed, Ciferri (1942) had already suggested a cycle of forms of which *O.europaea* L. was the archetype.

b) the hypothesis of a reduction in the number of species ascribed to the genus, as had been previously proposed by Turrill (1952).

Chapter 2

Origin of the species *Olea europaea* L.

Geological evidence

Introduction theory

A topic of current interest is whether the olive tree was present or not in Italy as an indigenous species, or whether it was imported from other regions. Hehn (in: Pecori, 1889) emphasized the fact that much of the vegetation present in Italy was not indigenous, and that many plants had been introduced from Asia. Caruso (1883) hypothesized that the cultivated olive tree (*Olea europaea* L. subsp.*sativa* Hoffm. et Link) arrived in Italy from the Orient, while the oleaster had probably already become established in Italy, since it was indigenous to the Mediterranean coast. Both Niccoli (1902) and Guyot (1949) agreed with this hypothesis. In fact, they had reported the presence of fossil remains (kernels) of olive trees and the co-existence of olive, myrtle and laurel trees in various Italian regions.

Indigenous theory and fossil remains

Other authors (Pepe, 1886; Neuweiller, 1905; Fiori, 1923-29; Pavari, 1932; Zangheri, 1976; Pignatti, 1982) have agreed on the indigenous origin of the species, suggesting it gave rise to the spontaneous variety, *O.europaea* L. subsp.*sylvestris* Miller, the oleaster. Renfrew (1973), Costantini (1983) and Peroni (1984) reported the presence of *O.europaea* subsp. *oleaster* Hoffm. et Link in Italy (Borgo di Pacengo, Peschiera, Salerno, Teramo, etc.) during the Bronze Age; some authors (Agosti *et al.*, 1980; Constantini *et al.*, 1987; Coppola, Costantini, 1987; Costantini, 1989) reported the presence of fossils of olive from the Neolithic and Mesolithic ages (Grotta del Uzzo, Sicily; Torre di Canne, Puglia; Grotta Rifugio, Sardinia). Pignatti (1982) maintained that the presence of the *Olea* genus in Italy was a spontaneous event. He based his opinion on the perfect adaptation of the *O.europaea* species to the thermophilic Mediterranean vegetation and on the finding of fossil remains of the plant dating back to the Pliocene Age, confirming the presence of forms similar to *O.europaea* which were present in Italy at that time.

Paleontological studies have established the presence of "oleastri" and cultivated olive trees during the Paleolithic and Neolithic Ages (10000-3000 BC) (Ciferri, 1941; Turrill, 1952; Camps-Faber, 1953; Arambarri, 1992).

Definite signs of olive cultivation come from Chalcolithic Palestine. Numerous well-preserved carbonized olive stones, as well as charred olive wood, were discovered in Chalcolithic (3700-3500 BC) Tuleilat Ghassul, north of the Dead Sea (Zohary and Spiegel-Roy, 1975).

Fossil remains of *Oleaceae* pollen have indicated the presence of the family in the Tertiary Ages (Almeida, 1963; Engler, 1964; Cronquist, 1981; Zohary and Hopf, 1988). A large scale utilization of *Olea* is indicated by increase, from Early Bronze age on, of olive pollen grains in cores obtained from the Sea of Galilee (Baruk, 1990).

Genetic origin

Chevalier (1948) defined the species as "a cultigenic group of forms which originated through mutation and/or hybridization".

According to the author, the species brings together a large number of varieties that differ in several morphological characteristics. Ciferri (1942), Mazzolani and Altamura Betti (1976-1977) have reconfirmed that *Olea europaea* L. is not a single species, but is rather a cycle of forms.

Given that the somatic chromosome number of *O.europaea* L. is n = 23, the studies carried out so far seem to indicate a possibly allopolyploidal origin of the species. Polyploidy in the species of the *Olea* genus is very rare or completely absent (Sax and Abbe, 1932; Taylor, 1945; Breviglieri and Battaglia, 1954). The allopolyploidal origin is obviously the result of hybridization between one parent with n = 11 and the other with n = 12. The resulting hybrid, which is completely or partially sterile, is not stable and only the successive duplication of the entire set of chromosomes (2n = 23x2 = 46) would produce a stable form that could be genetically reproduced (Taylor, 1945; Breviglieri and Battaglia, 1954; Acevedo-Coutinho, 1956).

Geographic origin of the species

Grisebach (in: De Grully *et al.*, 1886) reported a geographical division of the species (Table 10).

On the basis of the morphological comparisons among the different species of *Olea*, Breviglieri and Ciferri (1942) proposed a morpho-geographical subdivision of the species *Olea europaea* (Table 11). The authors proposed a sub-species of *Olea europaea* L. i.e. *euromediterranea* and "proles" *italica*; these "proles" were subdivided into the "subprolis" *tyrrhenica, adriatica* and *meridionalis.*

In trying to establish the geographic origin, or country in which *Olea europaea* "occurs and reproduces itself spontaneously" (Pecori, 1889), several authors attempted to make the biological country coincide with the country of cultivation, while others never addressed the problem at all. Sprecher and Bernegg (1929) believed that the "cultivation of some plants and the question of their origin and propagation in time and place are two different things". De Candolle (1883), instead, claimed that "the older a cultivation is in any given region, the more probable it is that the species arrived there spontaneously, through a series of geological events prior to the appearance of prehistoric man".

Centres of origin and diversity

De Candolle (1883) identified the "biological homeland" of the olive as Syria, where "real forests" form. Hehn (in: Sprecher and Bernegg, 1929) identified the region of origin as Anatolia, where Semitic populations had been the first to cultivate it. Chevalier (1948), Percy and Newberry (1937) located the "primary centre" of the cultivated olive tree in the countries of the eastern Mediterranean, the Black Sea and the Persian Gulf. Acerbo (1937) concluded that the "biological country" of the olive tree had stretched and spread from West to East of the Mediterranean (from the Canary Islands to western Africa and to the Iranian region in southwest Asia), and from North to South of the Mediterranean (from central-southern France to the region of Ethiopia and to the Mascarene Islands), a long time ago.

The heterogeneous biological conditions (diversity in the type and structure of the soils, edaphic conditions, etc.) of such a widespread geographic distribution had, in time, excluded the olive tree from some regions (for example, those with climatic conditions that are too cold, dry, etc.), and had increased its diffusion into other "countries", identified by the author. This had favoured and selected those species and varieties which were suitable for particular geographic conditions, thus increasing the variability that exists in the species.

Vavilov (1949-1950) made the centre of origin of the species coincide with its centre of diversity and localized the "biological country" of *O.europaea* in Syria and Iran. These countries made up part of the author's fifth "centre of origin" of the cultivated plants. Most of the scholars who have studied the country of origin of the olive tree over the years have affirmed, however, that the species came from Asia Minor (Pichat, 1866; Pecori, 1889; Fischer, 1904; Francolini, 1923; Peyre, 1938; Mazzolani, 1941; Guyot, 1949; Ciferri, 1950; Patac *et al.*, 1954; Standish, 1960; Morettini, 1972; Arambarri, 1992). Harlan (1971) localized the country of origin of the olive tree in the "centre A1" (in Asia Minor).

Simmonds (1976) considered the countries east of the Mediterranean to be the "first centre" of diversification of the species. From this area, the olive tree began spreading, where it enriched itself with new forms. The Aegean area was the "second centre" of diversification. Subsequently, it arrived in southern Italy and Tunisia, where the "third centre" of diversification originated.

On the other hand, some other authors (Tavanti, 1919; De Gasperin [in: Pecori], 1889; Sprecher and Bernegg, 1929; Evans [in: Percy and Newberry], 1937; Verdié, 1990) believed that the centre of origin of *O.europaea* was Africa (Ethiopia and/or Egypt).

Ancestral forms of the cultivated olive tree (*Olea europaea* L.)

Early studies (De Saporta, 1888) carried out on the botanical characteristics of the olive revealed that *O.excelsa* Aiton, *O.grandoeva* Sap. et Aiton, and *O.proxima* Sap. were similar in form to *O.europaea*, and he concluded that *O.europaea* arose from these forms. Several Authors (Acerbo, 1937; Principi, 1939; Ciferri, 1941) reported relationships only between *O.proxima* Sap. and *O.europaea*, the former being considered the ancestral of the domesticated olive.

Based on archaeological references, Mazzolani and Altamura Betti (1976-1977) arrived at the conclusion that the ancestors of the cultivated olive tree were to be sought in specimens of the tropical and subtropical species of *Olea* in the Afro-Asian distribution area, in particular, in *O.chrysophylla* Lam. and, in the authors' opinion, the unquestionably related *O. excelsa* Aiton.

Related species

For Chevalier (1948), the ancestors of *O.europaea* were to be sought in related species such as *O.chrysophylla* Lam., *O.ferruginea* Roy, *O.laperrini* Batt. et Trab., *O.somaliensis* Baker, and *O.verrucosa* Link. Almeida (1963) considered *O.europaea* to have descended from *O.cuspidata* Wall. which occurs in India, Afghanistan and Nepal. Vavilov (1949-1950) considered the olive was related to *O.chrysophylla* Lam. and also possibly to the species *O.cuspidata* Wall. and *O.laperrini* Batt. et Trab.

Common descendant

Ciferri (1942) considered *O.laperrini* to be related to *O.europaea*, while he doubted that any relationship existed between the latter and *O.chrysophylla*. The author based his observations on analyses of the fruit of the two species since *O.chrysophylla* has a fruit with a low or non-existent oil content, while the cultivated forms have high levels of accumulation of oil in the pulp. He discounted those theories that claimed that a series of progressive mutations and additional changes had taken place in a species which had a presumably stable genome. Ciferri thought that there may have been a common descendant which arose from a third species that had disappeared and which the author had recognized in *O.proxima* or *O.grandoeva*.

Hybrid origin

Ciferri (1950) subsequently hypothesized that *O.europaea* was most probably a "polybrid" originating from the hybridization of *O.ferruginea* of Asiatic origin, from which it had reportedly inherited the form of the plant and the color of the tomentum of the underside surface of the leaf, with some undetermined form of *Olea* which he defined as "proto-olea". The latter could have been found in the northern Mediterranean areas and as far away as Greece. According to the author, the hybrid had been diffused in other territories and, during this process, it was subsequently further hybridized.

Simmonds (1976) thought that the cultivated olive arose from the Sudanese and Egyptian *O.africana* Miller (=*O.chrysophylla* Lam.=*O.verrucosa* Link.), from *O.ferruginea* Roy. (=*O.cuspidata* Wall.) found in Iran and the Himalayas, and from *O.laperrini* Batt. et Trab. (with white/silvery leaves) found in the mountainous zones of the Sahara.

Zohary and Hopf (1988) found that *O.laperrini* Batt. Et Trab. (Saharan mountain in the Hoggar) and *O.europaea* L. subsp. *cerasiformis* Webb. Et Berth. (=*O.europaea* L. var. *maderensis* Hart.), which grow in the Mascarene Islands, may be said to be other species that are closely related to *O.europaea* L.

Zohary and Hopf (1994) later hypothesized that both the cultivated form of the olive tree and that of the "oleastro" are related to some species of *Olea* present in Africa, Arabia and Afghanistan, such as *O.ferruginea* Roy. (Asia) and *O.africana* Miller (=*O.chrysophylla* Lam.) (Africa). They considered that there were few morphological differences between the tropical species and *O.europaea*. In any case, since the African and near eastern forms are geographically separated from the Mediterranean forms, and even if they may be considered the progenitors of both, the authors still believe that *Olea europaea* is an independent species.

A series of studies undertaken by Hovanitz (1949), Ciferri (1950), and Zohary and Spiegel-Roy (1975) were in agreement regarding the hybrid origin of the species *Olea europaea* and suggested that this was confirmed by the variability in the shape of the stone and the leaves and by their tomentum. This variability had been traced to the remains of some stones found in Syria (Simmonds, 1976) and which dated back to the 4th millennium BC. Most probably, a series of genetic exchanges among the spontaneous forms followed some primary random hybridization: this had determined the definitive appearance of the newly cultivated species and increased its superior variability to that of its ancestors.

Evolutionary and cultural influences

Dionigi (1973) hypothesized that the origin of the cultivated form of olive is based on the contribution to the plant of various

Photo 1.
A plant of *O.europaea* L. subsp. *oleaster* Hoffm. Et Link – *O.europaea* L. subsp. *sylvestris* Miller located in Sicily (Photograph by A. Fodale, Istituto Olivicoltura, Palermo)

species and subspecies, i.e. those which show many wild characteristics, and those which are attributable to the *O.europaea* cycle. These wild forms, which had been subject to mutations and intense genetic recombination for long periods of time had, as a consequence, adopted cross-fertilization and propagation by seed: they demonstrated considerable heterozygosity and marked phenotypical differentiation. Among these individual plants, those with larger fruits were selected for cultural reasons, and were then subjected to asexual propagation. It was these which had given rise to the modern cultivated olive.
By synthesizing all of these data on the ancestors of the cultivated olive tree of today, it can be concluded that many of the authors cited above agreed on only two points:

1) the parent plant of the cultivated olive tree is *O.chrysophylla* Lam., from which the characteristic grey-silvery tomentum of the leaves was mostly probably introduced (Ciferri, 1942). In favor of this hypothesis is the presence of plants with characteristics that are more or less links between *O.europaea* and *O.chrysophylla* (Turrill, 1952);

2) the ancestral stock of *O.europaea* is likely to be *O.laperrini*. The greatest similarities between these two species are to be found in the white-greyish color of the foliage and in the shape of the fruit. Ciferri (1942) found that there was considerable similarity between *O.laperrini* and an Italian variety called "Mignola" or "Gramignola" (vigorous and productive).

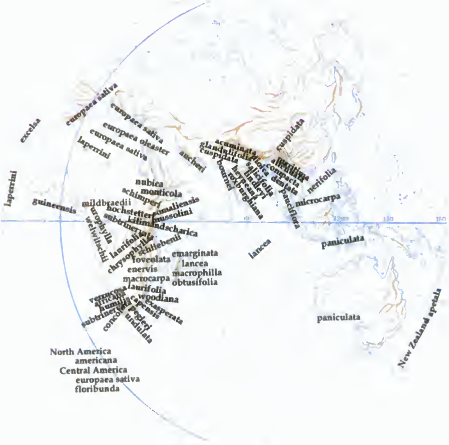

Figure 1.
Approximate geographic distribution of the numerous species of the genus *Olea* (Caruso, 1983; Ciferri, 1942; Mazzolani and Altamura Betti, 1978, 1979, 1980, 1981)

Chapter 3

Relationship between the cultivated and wild olives

Two subspecies or varieties have been distinguished in the species *Olea europaea* L.:

- ***The cultivated olive***, ***O.europaea*** L. subsp.*sativa* Hoffm. et Link (= *O.sativa* Hoffm. et Link = *O.europaea* subsp.? *sativa* L. varieties), parent plant to the cultivated forms (Linnaeus, 1764; De Candolle, 1883; Tamaro, 1901).

- ***The wild olive, O.europaea*** L. subsp.*oleaster* Hoffm. et Link (= *O.europaea* L. subsp. *sylvestris* Brot., *O.europaea* L. subsp.*sylvestris* Miller, *O.sylvestris* Miller, *O.europaea* L. var.*oleaster* DC.), to which the spontaneous forms correspond (Linnaeus, 1764; De Candolle, 1883; Morettini, 1959; Navarria, 1959; Pignatti, 1982; Zohary and Hopf, 1994). The wild olive has often been considered to be similar to *Olea buxifolia* Aiton (Percy and Newberry, 1937), the latter is now regarded as an independent species (Campbell, 1911).

The cultivated olive

In the Med-checklist, Greuter *et al.* (1989) (Table 3), *Olea europaea* L. subsp.*sativa* Hoffm. et Link is reported as a synonym for *Olea europaea* L., while the *oleaster* is considered as a subspecies of *O. sativa* Hoffm. et Link. In fact, the oleaster is not among those listed as a species in the Med-checklist.

According to Pavari's phytoclimatic classification (in: De Philippis, 1937), the cultivation area for *O.europaea* L. subsp.*sativa* Hoffm. et Link should be included in Lauretum, but it is spread out in a sporadic form also in Castanetum. Due to cultural treatments and to its ability to adapt to cold climates, it is found throughout the area of "Lecceta" (Pignatti, 1982). The olive is present in all the countries facing onto the Mediterranean, also in the Near East, North, South and Central Americas, Asia and Oceania (De Grully *et al.*, 1886; Morettini, 1972; Bartolini *et al.*, 1998).

O.europaea L. subsp.*sativa* Hoffm. et Link is extremely heterozygous (Dionigi, 1973); Zohary and Hopf, 1988), and demonstrates considerable variability. About 1300 cultivars have been described or cited throughout the world (Bartolini *et al.*, 1998), even if many of these are only ecotypes (Baldini and Scaramuzzi, 1952; Ruggini and Fedeli, 1990).

The wild olive

The wild form is thought to have originated in Asia Minor, in Nubia (Fiori, 1923-1929) and probably in Italy, where it grew wild in the Mediterranean vegetation. Today, it is abundant in Sardinia, Sicily and Puglia and, to a lesser degree, in Calabria and Tuscany (Morettini, 1959).

Oleasters or wild olive trees grow spontaneously in the Mediterranean vegetation, in the presence of the carob (*Ceratonia siliqua*), the mastic (*Pistacea lentiscus*) and the juniper, thus forming a bushy heathland (Pavari, 1932). They are present in the hot sub-zone of Lauretum (Morettini, 1959), where they constitute part of a thermophilic formation, that is, the forests of olivaster and carob (Fenaroli and Giacomini, 1958), and are characterized by an area of oleiferous vegetation (Pignatti, 1982).

Hypotheses and interpretations of relationships

Attempts to clarify the distinction between the wild and cultivated forms of the olive have been based on various theories and observations, some of which may be summarized as follows:

Spontaneous derivation

The relationship between the wild and the cultivated olive has always presented a complex problem. In fact, the question as to whether the former is a really spontaneous form or one that had been wild, then cultivated and found wild again, is still unanswered. According to some authors (Caruso, 1870; Cantoni, 1882), some forms of *O.europaea* L. subsp. *oleaster* Hoffm. et Link (=O. *sylvestris* Miller) probably gave rise to forms of *O. europaea* L. subsp. *sativa* Hoffm. et Link. According to others (Presta, 1774; De Candolle, 1883; Pecori, 1889; Ciferri, 1950), the wild forms were probably derived from the cultivated forms. In particular, Chevalier (1948) suggested that the oleasters, i.e. the trees with spinescent branches and small fruit, were the result of segregation of highly heterozygous individuals of the progeny. In fact, some cultivated forms have similar characteristics. Although these cultivated forms returned to the wild state, according to the author, they were ecotypes that would have been difficult to select and which represent a new class in the *O.europaea* L.subsp.*sativa* group.

Botanical distinction

Campbell (1911) hypothesized that the cultivated and wild forms were derived from botanically distinct forms. This theory was based on observations of the position of the inflorescence: axillary in the cultivated plants; terminal or mixed in the wild forms. The author hypothesized that the terminal inflorescence represented an ancestral form of some very distinct botanical species. He suggested that this position of the inflorescence had become latent due to cultivation and by exposure to different biological conditions.

Fischer (in: Navarria, 1959) subsequently confirmed the hypothesis that the two plants represent two different species, only one of which is capable of breeding. He maintained that the oleaster, or wild olive, when placed in cultivation produces larger fruit with a larger oil content than when growing wild, but it still remains an oleaster. Even if abandoned to itself, the cultivated olive tree does not become the wild type, even though it produces smaller drupes. Fischer's theory was further investigated by Amouretti and Camet (1985), who recognized two distinct forms within the species *Olea europaea* L.: the cultivated olive and the wild olive. In fact, "if the origins are still under discussion, the differences between the two trees cannot have escaped the notice of either the ancients or the moderns. Theophrastus (372-287 BC; *Historia Plantarum*) had chosen this species as an example in order to show the differences between a wild plant and a cultivated plant".

Olea europaea L.subsp.*sativa* Hoffm. et Link, the cultivated olive can reach a height of 15 to 20 meters, has grey bark, oblong to lanceolate leaves that are citron-green on the upper surface and silver-grey on the lower surface; its branches are rounded in section and flexible and the drupes are large and succulent. The oleaster, *O.europaea* L.subsp.*oleaster* Hoffm. et Link (= *O.sylvestris* Miller), on the other hand, is a small shrub (1 to 5 meters high), with spinescent and quadrangular branches in section, narrow short leaves and a small bitter-tasting fruit with low oil content (Amouretti and Camet, 1985).

Pavari (1932) and Pignatti (1982) supported the hypothesis that there is a difference between the wild and the cultivated olive tree, even though they could not assert whether the oleaster was spontaneous or was derived from the cultivated olive tree. The authors considered the oleaster a plant which belongs to the vegetation of insular Italy (it had already existed in Italy in the Pliocene Age and is native to Sardinia).

Hybridization theory

In the opinion of Zohary and Hopf (1988, 1994), the cultivated olive tree is related to the wild forms that are found in the Mediterranean Basin, called oleasters. These bushes or trees are interfertile with the cultivated forms, and are linked to them by spontaneous hybridization. According to the authors, it would be wrong to hypothesize the existence of two independent species, as other authors have done (Campbell, 1911; Fischer in: Navarria, 1959): the genetic and morphological affinities between the cultivated forms and the wild forms make it possible to consider the oleaster as the "wild type" of the cultivated forms and to insert it into *O.europaea* either as a subspecies (subspecies o*leaster* Hoffm. et Link) or as a variety (var.*sylvestris* Miller = var. *oleaster* DC.).

Photo 2.
An olive tree growing in the Gethsemane Garden (Jerusalem)

Dionigi (1973) maintained that the "genteel", "wild" and "intermediate" phenotypes, called Olive, Oleaster and Olivaster or Olivastro, belong to a single genetic group. According to the author, the fact that there are more phenotypes with "wild" characteristics than those with "genteel" characteristics bears out the theory that the cultivated olive was derived from the wild form.

Olivastro (Olivaster)

In addition to the oleaster, other authors (Caruso, 1883; Morettini, 1959) differentiated the olivastro in *Olea europaea* L. subsp.*sativa* Hoffm. et Link since, although it grows wild, it possesses morphological characteristics that are similar to those of the cultivated olive (Table 12). The authors maintained that these trees are derived from cultivated olives which are naturally scattered in the woods and on the heathlands: in short, the olivastro most probably represents a transitional form between the oleaster and the cultivated forms.

The controversial conclusions or hypotheses reported in the literature can probably be attributed to the limited knowledge available on the morpho-agronomic behaviour of oleasters in their natural habitat and on olivastros and cultivated olive trees (Morettini, 1959).

Photo 3.
An olive tree located in the Temple Mount (Jerusalem)

Section II

Historical documentation

Chapter 4

Geographical diffusion

The olive tree is among the oldest and most widespread arboreal fruit-bearing species. It was known long before writing, painting and mosaics were developed. (Cantoni, 1882)

The plant, with its products, has been in the forefront of the history of mankind – its civilizations, religions, politics, colonial expansions, arts, and economic survival – to the point where it has become an integral part of traditions, cultures, and myths. The history of the cultivation of the olive and of the production of olive oil have merged with the history of the great Mediterranean civilizations. Nevertheless, it is difficult to define precisely the place in which the first olive trees were cultivated and who were the first olive-growers.

The sequence of diffusion of the species (*Olea europaea* L.) is not well known, and it is difficult to attempt any chronological reconstruction. The following is a synthesis of existing bibliographical information (Table 13).

Near East and Mediterranean Basin

Diffusion westward

It is believed that, in ancient times, the olive was first brought into cultivation by an indigenous population who lived in the "Iranoturaniana" region (Near East) (Ciferri, 1950). From this region, proceeding from east to west, it supposedly spread to the different Mediterranean countries (4th millennium BC), where it found favourable climatic and edaphic conditions (Acerbo, 1937). But the origin of the cultivation of olive trees is obscure, even if it is widely believed that the plant was cultivated on the island of Crete during the Minoan Age (3000-1500 BC) and even in very ancient times on the Cyclades Islands and in Asia Minor. The finding of kernels in the localities of Bihlos in Lebanon (3000-1500 BC) bears witness to this (Simmonds, 1976).

The historical documentation of the first cultivation of olive trees coincides, in general, with the evidence of the origin of the first prominent civilization that arose within or around the Mediterranean basin. It is also likely that this civilization used olive oil as a comestible product in preference to other oils such as sesame and castor. It is well documented (Pecori, 1889; Acerbo, 1937) that Persians, Assyrians, Babylonians and the Nabatei did not obtain oil from their olive trees, but used sesame oil and castor oil for eating and as lubricants. However, the oldest historical documentation on such uses dates back to the Code of Hammurabi (2500 BC), in which several rules and regulations for the sale of olive oil are reported, and to several Egyptian papyri that date back to the 8th dynasty (2300 BC) (Viola, 1989).

The early cultivation of olive trees and the use of olive oil have been attributed to the Hamitic-Semitic populations that lived in the south of the Caucasus and west of the Iranian tableland (6000 BC) (Acerbo, 1937; Viola, 1989). The terms "sait", "zait" and "zeit" are derived from ancient Semitic terms used in reference to the olive tree (De Candolle, 1883). Due to the initial Phoenician invasions and later Arab conquests, these linguistic roots represent the basis of the word that refers to the olive tree and olive oil and its derivatives in northern Africa and in several areas in southern Europe. Even today, "zeitun" ("seitun"; "Sjetun") is the Arabic word for the olive tree in North Africa; "Zaituna" is the name of an indigenous form in Sicily (Italy), and "aceite" is the Spanish word for oil (Tables 14, 15, and 16). Olive fruit names are listed in Table 17.

Eastern Mediterranean

Through the migrations of the Hamitic-Semitic peoples, who represented groups of organized civilization, the cultivation of the olive tree shifted towards the eastern Mediterranean, into the regions of, Syria and Anatolia (15th century BC), where a particular climate (temperate, warm environment) and soils (calcareous, loose and sandy, with small stones) existed that were favourable to its cultivation (Acerbo, 1937; Camps-Fahrer, 1953; Iacoboni, 1989).

From the olive tree, the populations of these regions obtained the oil which was used to lubricate and to create light, as well as a salve for the body: they had a fruit that was easy to conserve, a food reserve for animals during the driest seasons, and wood which could be worked and burned. These peoples also had - even if at a later historical period - an oil which was considered a foodstuff (Cato, 234-149 BC, praised its nutritive qualities in *De Agricultura*).

Palestine

From ancient times, Palestine has been an area where the cultivation of olive trees was widely developed and where the consumption of their products is extensive. The olive tree was a fundamental part of the patrimony of Hebrew arboriculture, and was the most propagated, cared-for and profitable species grown. A great deal of oil was used. It served for lighting, as food, as a cosmetic and as a medicine. The Semitic peoples regarded the olive tree and its oil with great respect. In fact, "the olive tree is the richest asset of Hebrew agriculture, and olive oil is the golden liqueur that benefits the body and illuminates the spirit" (Acerbo, 1937). This profound esteem was transmitted to many areas as a consequence of the migrations of this populace to many countries, from Babylon to eastern Africa and Italy. The importance of the Hebrew peoples as pioneers in spreading the cultivation the olive tree and of the use of its oil in the Mediterranean is evident from the diffusion of the Hebrew name for the olive tree (zait or sait) (Table 14).

Syria

In Syria, the development of the cultivation of the olive, which had most probably occurred during very ancient times, can be attributed to the pedological-climatic characteristics favourable to olive trees and to the capabilities of its inhabitants, the Phoenicians, who were considered skilful farmers, shop-keepers and colonizers (Boardman, 1976). Indeed, Pliny the Elder (23-79 AD; *Naturalis Historia*) noted that the olive trees in Syria had small fruits with a delicious pulp. There are few Phoenician historic sources, but it is known that the inhabitants of this area attached great importance to the olive tree and to its fruit.

The oil was primarily used as an ointment and secondarily for eating and for lighting.

Anatolia

Bibliographic information regarding the cultivation of olive trees in Anatolia is non-existent, and it is therefore impossible to reconstruct the establishment and diffusion of the plant in this region.

Egypt

The olive probably arrived in Egypt, a country abounding in sesame, castor and safflower oils (Stager, 1985), from Syria and/or Asia Minor (3000-2000 BC) (Percy and Newberry, 1937; Arambarri, 1992), alternatively from Palestine (13th century BC) (Camps-Fabrer, 1953), or from Crete (2000 BC) (Patac *et al.*, 1954). In fact, in Egyptian texts and on the walls of tombs, the names of Cretan palaces and merchants of the island have been found (Dubois, 1925; Verdié, 1990). The exact period of introduction of the species into this region is not known, and historians cannot seem to come to any agreement on this point.

For certain authors (Percy and Newberry, 1937; Zohary and Hopf, 1994), the period of introduction of the tree corresponds to the 8th Dynasty (21st century BC); for others (Acerbo, 1937; Bosi, 1994), to the 11th and 13th Dynasties (15th century BC). The presence of olive leaves in the tombs during the latter dynasties testifies to this fact.

Olive oil was definitely in use under the Ramseses. The "Harris" papyrus of the 20th Dynasty testifies to the fact that Ramseses III (1198-1166 BC) ordered olive trees to be planted around the Temple of Thebes, and that the production of the equivalent of 2,750 hectares of olive trees be offered to the god Rà. In the tomb of the same dynasty, votive crowns plaited with olive leaves were found (Francolini, 1923; Verdié, 1990).

Olive oil was used in Egypt in the preparation of perfumes, remedies and salves, as a condiment and for lighting. The Egyptians used oil in their religious rites: anointing with oil was the sign of purification for those who were preparing to make a sacrifice or approaching the statues of the gods.

However, the cultivation of the olive in Egypt was not widespread, and the country did not become a large producer of oil. This may be due to the climatic conditions of the area which were unfavourable for certain phenological phases of the plant. It became possible to cultivate the trees successfully only in the region of the river Nile. These facts were reported in the writings of several historians (Strabone, 63 BC, 19 AD; Theophrastus, Athens-287 BC, *Historia Plantarum*; Pliny the Elder, *Naturalis Historia*), who referred to good quality oil being produced but only in a few areas (the present-day Fauem oases) and to the cultivation of very succulent olives although they were lacking in oil. Egyptian texts (Acerbo, 1937) also refer to the high consumption of olives as an edible fruit, to the production and consumption of inferior oils (castor and safflower), and to the tradition of Egyptian traders operating as importers of olive oil.

The Egyptians introduced the olive which had, most probably, been established only in the Nile basin, into Nubia and the region of Ethiopia (XXI-XVth century BC, Acerbo, 1937). This limited area of cultivation may be demonstrated by the poor diffusion of the term "tat" which had been used to refer to olive trees in Egypt (Acerbo, 1937). Moreover, this term formed the root of the names of both wild (tazebujt) and cultivated olive trees (tazemit), used by the Berbers (De Candolle, 1883). Some authors attribute the derivation of the above-mentioned names to the term "azemmur" (Table 14), with which the grafted oleaster had been associated (Camps-Fabrer, 1953).

Aegean islands

Due to the trading activities of the Phoenicians, olive trees were taken from Syria to Cyprus (16th-15th century BC) and to the islands of Asia Minor (Acerbo, 1937). In these regions, the olive tree found the kind of pedological-climatic conditions which favoured its spread. This plant is mentioned in the Homeric tradition and in its poems (9th century BC). The references are most probably to wild olive trees which flourished there. In the *Iliad* and the *Odyssey* the olive tree was mentioned as being a species of wood found in gardens: its oil was used as a cosmetic for anointing the body and for lighting but it was not mentioned as being used for eating purposes.

Olive-growing was subsequently established on the islands of Rhodes, Samos (called "elaiofutos" - i.e. olive-tree vegetation - by Aeschylus, in *Oedipus at Colonus*), Lycia, Delos and Miletus. These islands were specifically noted by historians due to the presence of olive trees and as the sites of a flourishing oil-making industry (Talete, 639-546 BC; Francolini, 1923; Hansen, 1988) which later moved to the mainland (Atticus, Thessaly, Epirus) (14th-12th century BC: Peyre, 1938; Guyot, 1949; Zohary and Hopf, 1994) (1800 BC: Arambarri, 1992). The success of the olive tree in the Hellenic regions was due to its vigorous growth characteristics and its capacity to use the calcareous soils of the Aegean and central Mediterranean to its best advantage (Patac *et al.*, 1954).

Greece

Archaeological studies have demonstrated that the olive was established in Greece in the period preceding Minos (3500 BC) (Zohary and Hopf, 1994): this may prove that wild olive trees were present before the advent of the Greek civilization and that the cultivation of olive trees had begun during the Paleolithic or Neolithic Ages (5-10,000 years BC) (Zohary and Hopf, 1988).

During their colonization of the Mediterranean (6th century BC), the Greeks transmitted their culture, their alphabet, their temples and - independently from the Phoenicians - the cultivation of olive trees. This does not imply that they introduced the olive to the lands that they had conquered, but it appears that they handed down cultivation techniques, probably including grafting and procedures for extracting the oil (Guyot, 1949).

Western Mediterranean and Southern Europe

Sicily and Sardinia

Olive trees spread to the largest Italian islands (Sicily and Sardinia) partly due to the activities of the Phoenicians but, above all, to the increase in the number of Greek colonies. In these regions, the more advanced agricultural arts of the Greeks replaced those of the "paleo-Italic" populations. The olive was present in Sicily in the 7th century BC (Acerbo, 1937). Historians of the time mentioned the olive groves of Agrigento and spoke of the image of olive branches reproduced on coins of the 5th century BC (Acerbo, 1937). It should be emphasized that reference was made to the cultivation of olive trees, but not to the species.

Italian Peninsula

The Etruscans had imported oil from Attica (Greece) (Heurgon, 1961) for many years and used it in the preparation of perfumed ointments (7th-6th century BC) and for lighting (Ampolo, 1980). It is very probable that the Etruscans were the first importers of oil from the Greek colonies of Campania. Olive seeds have been found at Cerveteri and Rome (6th century BC) (Ampolo, 1980).

The discovery of wild olive tree leaves, by Pecori in 1889, confirmed their presence in the Po valley at the time of the "Terramaricoli", in Umbria (at Gubbio) and in Tuscany (at Leghorn) during the Miocene Age. Unfortunately the species was not identified.

That the Romans had their first contact with the olive through the Greek colonies is demonstrated by the Latin name "olea" which is clearly Greek (elaion) in origin. Pliny the Elder reported that olive growing was widespread under Tarquinius Priscus in 615 BC (Niccoli, 1902; Francolini, 1923). Bosi (1994) traced the Latin word "oleum" and the Greek "elaion" back to the Semitic root "ulu", with which the olive tree had been associated.

Beginning from the 2nd century BC (Arambarri, 1992), olive growing progressed throughout Magna Grecia (Calabria, Basilicata, Puglia and Campania). The presence of olive branches on the coins of Crotone (Pliny the Elder, Columella, Virgil) and the fame of the olive oil from the plains of Sybaris, the writings of Theophrastus (in: *Historia Plantarum*) which mention the olive trees of Taranto, and the writings of Cato (*De Agricultura*) which mention the trees of Calabria and those of the Salentine peninsula (Varrone, in: *De Re Rustica*) all testify to the growing importance of the olive tree.

Olive trees and their oil were known and used by the inhabitants of central Italy (Lazio region: 500 BC; Di Macco, 1969). Olive trees were reportedly distributed from Lazio to Sabina, Sannio and Piceno. They later arrived in the Venetian regions from where they were introduced to Istria (Pecori, 1889).

In the gardens of Pompei (Jashemski, 1993), high levels of olive pollen and two fragments of carbonized olive stone (*Olea europaea*) have been found. Furthermore,

the small sizes of some ancient root cavities and the planting pattern used suggest that olives had been grown there and that this had once been an olive nursery.
The last Italian region to be acquainted with olive oil was Liguria (Acerbo, 1937). This region subsequently became the communications centre between Italy and Gaul. The populations of this region, as a result of their relations with the Romans, learned the uses and cultivation of olive trees.

The Romans extended the cultivation of the olive to all the territories that they had conquered. This was an answer to both economic and political problems. An increase in the consumption of olive oil could be met, even if the cultivation of the olive was abandoned on the Italian peninsula, and the conquered peoples could spend their time cultivating and defending their territory, thereby reducing the possibility of insurrection (Camps-Fabrer, 1953; Chazang-Gilling, 1994).

Under Hadrian (2nd-3rd century AD), the importance of the olive, evidenced by an increasing interest in its cultivation and products, reached a high level in Imperial Rome. It was Hadrian who gave olive-growing the necessary impetus.
Descriptions of cultivation techniques and oil-making procedures can be found in the writings of Horace (65 BC, in: *The Carmina*), Virgil (19 BC, in: *The Georgics, Bucolics*), Cato (234-149 BC, in: *De Agricultura*), and Varro (27 BC, in: *De Re rustica*). Columella (42 AD), in *De Re Rustica*, observed, "*olea prima omnium arborum est*". In these works the olive, together with the vine, became the species of fruit trees to which the farmer dedicated most of his time and interest and from which he obtained considerable profit.

Southern Europe

With the help of the "Focesi" (Francolini, 1923), the cultivation of olive trees was introduced into the southern regions of Gaul (600 BC), especially in the area of Marseilles and then in the valley of the Rhône.

It is difficult to evaluate the evolution of the cultivation of olive trees in southern Europe due to the lack of historical information. Acerbo (1937) claimed that the Phoenicians brought olive trees to the Iberian peninsula; according to other authors, it was the Romans (207-206 BC: Patac *et al.*, 1954; Arambarri, 1992). Caruso (1883) and De Candolle (1883) believed that it was the Arabs who introduced olive trees to the Iberian peninsula. This last conclusion may be borne out by the terms "azebuche" and "aceite", which are Arabic in origin and mean "olive tree" in Andalusia (Tables 14, 15). However, in many areas, the term "aceite", with its Arab roots and "oleos santos", clearly Latin in derivation, co-exist. This evidence offers some validity for each of the two points of view. The Arab presence in Spain for approximately 8 centuries not only left its considerable linguistic mark, but probably also the olive.

In Portugal, the spread of olive trees was slower: in fact, the inhabitants continued to use butter and not oil in their diet for quite some time (Patac *et al.*, 1954).

North and North-West Africa

North Africa

The development of the olive in North Africa is of particular importance and was due to the land reclamation programs carried out in this area by the Romans (Camps, 1984). The olive-growing potential of Africa was utilized by the Roman emperors to ensure a supply of oil to Rome. For example, the Berbers had been considered a colony for "exploitation" and were made to tend the trees. Moreover, at that time, the safety of the Empire, especially in the southern regions, had been menaced by the raids of nomadic populations. The Romans used both force and the creation of "sedentary peoples" as a consequence of the cultivation of olive trees, as the means of dealing with this situation. Under the rule of Trajan, the subjected peoples were assigned lands on which they were obliged to reside and where they had to cultivate olive trees (Camps-Fabrer, 1974).

North-West Africa

Several authors (De Candolle, 1883; Acerbo, 1937; Camps-Fabrer, 1953) have claimed that the olive was introduced into North-West Africa by the Phoenicians (14th-12th century BC), and possibly into Libya and Tunisia when they founded Carthage (9th century BC). It may also have been introduced by the Greeks (8th-7th century BC), who brought it into Cyrenaica. Theophrastus (Athens-287 BC) wrote that Cyrenaica was a land rich in olive trees, which produced abundant oil. The modern authors based their hypotheses on the Semitic origin of the words "Zitoun" (the cultivated olive tree) and "Zit" (olive oil). Nevertheless, olive growing did not develop in these territories. Carthage, a Phoenician colony and maritime power of the western Mediterranean, had been the only exception

Photo 4. Olive mother plant collection in Kulu Valley, H.P. (India)

since a flourishing olive-growing industry and its accompanying trade developed in this region.

However, analyses of carbon and pollen which had been preserved in several archaeological deposits have confirmed that oleasters had been established in North Africa as early as the 12-9th century BC, and possibly even before that (Camps-Fabrer, 1974; Lenoir and Akerraz, 1984).

When the Romans reached Africa, the Berbers had already begun grafting oleasters. According to Mago (the Carthaginian agronomist), the Carthaginians taught their conquerors the art of grafting olive trees (Camps-Fabrer, 1953).

Worldwide diffusion

Olive trees arrived in Latin America in the 16th century AD, with emigrants from the Iberian peninsula (Laussert and Brousse, 1980). The trees arrived in Argentina in 1556, in Peru in 1560, and then continued on to the Antilles, Chile and Mexico in 1697 (Navarro *et al.*, 1961). From there, the Franciscan friars (Hartmann and Papaioannou, 1951) introduced them into California in 1769. More recently, they have been introduced into Australia, South Africa, Japan, New Zealand, China, India, Pakistan, and other countries.

Photo 5. Olive trees (16 years old) in hydroponic culture.

Chapter 5

History, legend, religion and symbolism

Symbolism linked to the plant

In many civilizations (Phoenician, Hebrew, Egyptian, Greek, Roman, Arab, etc.) and religions, the olive tree has represented a symbol of human continuity. It has also been a point of historical reference:

- politically (it has been used to represent the elements of permanency and hegemony of a population);
- culturally and intellectually (the valiant and the sage were decorated with crowns of plaited olive leaves);
- as a symbol of peace (political stability was necessary in order to cultivate a tree that only fruits after many years);
- as a divine symbol: in intensely hieratical societies, in which religion and the priesthood guided all everyday activities, oil was used in libations, anointings and oblations (Acerbo, 1937).

Greek mythology and symbolism

The olive is the "Greek tree" *par excellence*, and was considered sacred and worthy of reverence. For the ancient Greeks, most trees had arisen from the tragic genealogy of man and the plants represented the metamorphosis of man as a result of some sacrilege (Standish, 1960). The olive tree was the exception to this rule and it was believed that it had neither a human ancestor nor a sacrilegious genealogy, but had originated directly from thought, and represented a divine gift offered to men by the gods (such as the fire from Prometheus and the horse from Poseidon).

In Greek mythology, the olive was linked to the origins of the city of Athens. In fact, Poseidon and Athena fought over Attica and each was told to make an offering which would be judged. The former planted the trident in a cavity on the Acropolis and made a stream of water emerge, which he called "sea" or "wave". According to another legend, he created the horse that was as fast as the wind and useful to men.

Athena, goddess of wisdom and peace, chose to present a small branch. She said that it would become a strong tree, capable of living for centuries, and that for centuries it would produce fruit good enough to eat and "from which it was possible to extract an extraordinary liquid for preparing food for men, treating wounds, giving strength to the body and light during the night, since it was able to maintain a small flame for hours" (Verdié, 1990). Athena thus "created" the first olive tree. However, in trying to interpret this mythological fact, we can say that she most probably had grafted a wild olive, thus giving rise to the cultivation of this tree. The tribunal of the gods decreed that Athena's gift was more useful than Poseidon's, and Attica was thus placed under the protection of the goddess. The capital was called Athens and the olive tree became sacred.

The symbolism of the olive tree was based on the relationship between the goddess Athena and the Attica region, i.e., between the *polis* or the goddess's subjects, and the territory (Detienne, 1970). This relationship represented the beginning of the control of "space" on the part of a group of people. The political importance of the olive tree was expressed by the laws passed in order to guarantee the tree protection. Indeed, the death penalty was enforced if anyone destroyed an olive tree. The owners themselves were forbidden - with large fines for violators - to cut more than two feet from a tree in any one year. A Council of the Elders (Areopago) was assigned to collect the oil of the sacred olive trees, and this became destined for the winners of the games (Chazang-Gilling, 1994). Olive oil therefore acquired an honorific aspect: it represented the prize for winners of Greco-Roman games (for example, the winners of a chariot race received 140 amphoras), as well as an offering of men to the gods and to the "holy men" (Verdié, 1990).

It was also believed that the olive tree had arisen spontaneously and flourished following the fire in the Temple of Athena. The olive tree therefore became the "luminous symbol" of regeneration and fecundity of the Greek people (Herodotus, 426 BC). It also played an important role in the "three ages" of the citizens (Verdié, 1990). Newborn babies received a small olive branch; the young winners of the games received the olive tree of Athena and crowns plaited with leaves of the tree as trophies; the elders who participated in the games carried a branch of the tree. For the dead, the crowns of olive leaves represented their victories in the battles of life (Verdié, 1990).

Religious symbolism in Greece

The olive tree then took on a religious significance and became incorporated in the narrations involving the plant and war-time traditions. "Before leaving for the conquest of Greece, Xerxes said that he had appeared in his own dream as being crowned with olive fronds and the branches of his crown seemed to be growing until they covered the whole Earth". In this context, the royal personage is linked to the olive tree, and it can be affirmed that "the olive tree is a political symbol assigned to translate a religious type of relationship between the sovereign and a part of the cultivated area" (Chazang-Gilling, 1994).

This relationship was also cited in the *Odyssey*, where the sovereign appears "like a person who nurtures and whose power is translated into pastoral and arboricultural plans". Nevertheless, in his works, Homer also proposed the plant as an instrument of the gods which had mythical, poetic and symbolic aspects. In this context, the olive tree became not only the symbols of life, peace and glory, but also those of vengeance and death.

Roman symbolism

The Greek symbolism associated with the olive was adopted by the Romans, who had also revered and venerated this plant. For the Romans, the cult of the goddess Athena became the cult of the goddess Minerva, and olive leaves combined with laurel leaves were used for plaiting crowns intended for the valiant and for heroes. For the Roman people, the olive represented a cultivated tree, a religious power, and a theme of political organization; it represented the relations between the city and the countryside, between Rome and the conquered lands.

Hebraic symbolism

In the Old Testament, the olive tree is praised for its fecundity, and its evergreen appearance

(Ecclesiasticus 9, 7). The branches were utilized during feasts of the tabernacles, and newly-weds arrived at the ceremony carrying them. The Prophet (Jeremiah 11, 16) compared the olive tree to the just man; in Deuteronomy (6, 11 and 8, 8), it was compared to wisdom. Together with wine and grain, it represented one of the essential foods with which God fed His people. The dove that returned to Noah (Genesis 8, 11), after the universal flood, carried an olive twig in its beak (even if, according to Moldenke and Moldenke, 1952, the twig was not from an olive tree, but from *Tamarix mannifera* (Ehrenb.) Bunge). In this context, it was taken up as a symbol of the peace that had been re-established between God and man, and as a new beginning of life.

Christian tradition

The Greco-Roman symbolism of the olive tree was handed down by the pantheistic civilizations. It was incorporated in Christian traditions from the times of the persecutions until 380 AD when, by an imperial edict, the new religion became the "State religion". Its symbolism is evoked in the holy scriptures (Delaveau, 1987), and represents divine benediction, a sign of salvation and the symbol of eschatological happiness.

In the New Testament, the cross of Jesus Christ was made of olive wood. The tree of the Cross once again revived the old myth of the plant as the "centre of the world" (Verdié, 1990).

Arabic symbolism and religion

The symbolic function of the olive tree was transmitted towards the western Mediterranean as a result of the Greek migrations, and towards northern Africa during the Roman hegemony. For these populations, the olive tree and its oil represented the power of the city-state. In particular, oil was regarded not only as a food and pharmaceutical product, but also as an "energetic material", and it was considered the "petroleum of antiquity" (Chazang-Gilling, 1994). The cultivation of olive trees was introduced into the Arab world by foreigners (Coupit, 1904). It then became an integral part of the countryside, of the culture and the local economies.

In the verbal tradition of the Kabylia (Algeria), the olive tree was the sacred tree *par excellence*, and was at the centre of numerous ceremonies; it was considered a representation of the "invisible one" and "the wonderful one". In the accounts of the wars between the Turks and the Kabylian tribes, it was cited as the "rod which becomes green again". The Turks tied their horses to poles made of olive wood and, when they left an area, the poles took root and rapidly became adult and productive trees (Lacoste-Dujardin, 1982). For these tribes, the olive tree was an integral part of daily life, associated with everyday actions and rites. It was a symbol of protection and fertility: women placed themselves under its protection, and asked the tree to grant them fecundity and good health. They used to tie the fringes of scarves or threads of multicolored wool to its branches (Verdié, 1990).

The olive tree was also associated with the rites of the dead and in particular with those of "holy men" whose tombs bore symbols of trees such as fig, oak and pistachio but, above all, olive). These tombs became sanctuaries. In the Muslim religion, the olive tree is the symbol of goodness: Mohammed had faith in the horse for its speed, strength and salvation, and in the olive tree for its faithful goodness (Koran, XCV, 1).

Symbolism linked to the fruit and oil

The fruit and the oil of the olive are, symbolically, on a par with the tree, and have had a significant influence historically. The fruit has been a symbol of abundance, prosperity, reliability and perpetuity. The olive has been appreciated, since very ancient times, not only as a simple food but also as one which can supply energy; it represented an important element in the peasant's diet and in the soldier's provisions.

Oil extraction

Oil was a symbol of wealth, the food of man and the gods and a sacred liquid. According to the Greeks, the art of extracting olive oil was first introduced by Cecrops, the first king of Attica, the founder of Athens and of the Areopagus. In another legend, it was reported that the original concept of obtaining oil from the fruit was made by Aristeo.

The mythology surrounding Aristeo, the ancient pastoral god of the Arcadians, Thessalians and Boeotians, and a divinity that was indigenous to the Siculians (Sicilians), led some historians to conclude that the cultivation of olive trees and the oil-making industry may have arrived in Italy in ancient times through two routes - the Libyan-Phoenician and the Greek one (De Candolle, 1883). According to tradition, as reported by the ancient historians Cicero, Pliny the Elder and Diodorus Siculus, this god was reputedly the inventor of the system of oil extraction (Hehn, 1874). According to Pausanias, Aristeo had been the lord god of Sardinia before arriving in Sicily. Greek historical tradition indicated that he had also been worshipped in Boeotia, Thessaly and Attica and that the African and Greek origins of the oil-making industry in Sicily sprang from these roots (Hehn, 1874; Cantoni, 1882).

According to the Egyptians, the discovery of the technique of extracting oil from olives was due to Isis, sister and wife of Osiris, supreme god of Egyptian mythology. Greeks and Romans perfected this technique, and the primitive extraction of oil was carried out using rudimentary pestles that exploited the spontaneous separation of the oil from the "vegetation water". The equipment used and found in archaeological excavations of the sources of many ancient civilizations are better witnesses than any written document to the practice of extracting oil (Camps-Fabrer, 1974). Columella (*De Re Rustica*) described a machine for squashing or grinding olives that was called "Tudicola" (Laporte, 1976-1978).

Oil in commerce

In ancient times, the sale of oil was regulated by special laws (2500 BC: Babylonian Code). The Phoenicians and Greeks exported it to the other countries of the Mediterranean by ships that were capable of transporting large amphoras. The Romans introduced advanced systems of oil collection and distribution in the countries which they had conquered. This gave rise to flourishing commerce. "Boards of importers" and the "oil-production area" helped to organise trade based on the exchange of oil. Lastly, beginning in 1700 AD, impetus was given to a freer trade market for this oily substance. It is now known world-wide due, to a large extent, to the merchants of Lucca (Mastrangelo, 1982).

Domestic olive oil consumption

For a considerable period olive oil was rarely used as a food. It was a part of the diet only in the coastal areas of the Mediterranean, where the Greeks had used it both raw and for sauces, soups, etc. (Viola, 1989). The quality of the oil was determined by "oil tasting". The average annual consumption of oil for a free man and citizen was, at the time, from 50.5 to 55.5 liters per year; 15-20 liters were used in food preparation, 20 litres for hygiene, 2 litres in sacred ceremonies, 3 litres for lamps, and 0.5 litres for medicinal use (Verdié, 1990).

The Romans were the first to classify olive oil into three different qualities, and a price for each one was established through Diocletian's edict: the first was the first pressing, or virgin oil (40 denari), second-quality oil (24 denari), and ordinary oil (12 denari) (Verdié, 1990).

Until the Middle Ages, oil was not part of the diet of the Italian population who had adopted lard as a cooking oil (Mastrangelo, 1982). With the advent of commercial freedom (second half of the 18th century), olive oil became a regular foodstuff and the different grades of oil began to be used for other purposes such as soap manufacture, wool treatments and lighting.

Therapeutic uses

In ancient times, oil was mainly used therapeutically and it was extremely important in general hygiene and care of the body. Massages with oil softened the skin, relaxed the muscles, and were considered "a fountain of youth". According to Democritus (370 BC), anointing the body was the surest way of living long and in perfect health; Hippocrates (351 BC, in: *De Dieta Salubris*) prescribed anointing with oil and wine for all that ails (Verdié, 1990). Before battle, soldiers usually anointed themselves: "In antiquity, in cold seasons and places, when they had to fight the enemy, soldiers would first anoint their chests and arms; they were thus warmer and could move more rapidly" (Pecori, 1889). The Roman captains reminded their soldiers, "*curarent corpus*", before battle, and the ancient writers attributed Hannibal's victory over Sempronius to his soldiers' having anointed their bodies with oil (Pecori, 1889). The use of oil over the entire body avoided the dispersion of heat and dissipated tiredness. Athletes were anointed with oil: after taking part in sports, this gave them a sensation of warmth and well-being. The secret of beauty and beautiful hair was also attributed to olive oil.

Medicinal uses

Olive oil was used in medicine during

ancient times and throughout the Middle Ages. Historical references have mostly mentioned its therapeutic use. In "*De Dieta*" and "*De Dieta Salubris*", Hippocrates cited olive oil and spoke of its pharmacotherapeutic use. The ancient physicians knew of its astringent and antiseptic effects. Discorides (*De materia medica*) said that the oil obtained from unripe olives should be used in the formulation of unguents and as an emollient and laxative in cases of colic or biliary or nephritic calculi (Viola, 1989). Olive oil was also used as a component of poultices and ointments for skin lesions, and was used to treat headaches and scalp disorders. Pliny the Elder spoke of a form of olive oil that, when kept in the mouth, preserved the whiteness of teeth and cured diseased gums.

Oil in perfumery

The Greeks used an oil, which was most probably oil extracted from oleaster, for making perfumes. When mixed with different essences, such as those from laurel, myrtle, citron and rose, it formed the basis for producing perfumes and salves.
The Romans also probably used olive oil in the preparation of perfumes and a "House of Perfume" was once erected in Pompei; the remains of olive trees and plants which had been used to create essences of roses, etc. have been found on this site.

Ceremonial and religious rites, symbols and traditions

For the people of antiquity, olive oil regenerated and restored elasticity to the body and cured diseases. The ritual of anointing oneself with oil also represented a transformation from daily habits into the realm of the sacred. Symbolically, unction is the mark of the civilized man (Homer, the *Odyssey*, Canto 5-6), and it is a way for man to feel at ease in society (Verdié, 1990).

In other cultures unction was, and still is, associated with existence and was a promise of fecundity. In the Kabylia (Algeria), the application of oil to work instruments before ploughing had represented an alliance between men and the gods, to whom the harvests were offered, and ensured that the coming harvest would be abundant (Verdié, 1990).

In both the Old and New Testaments there are numerous references to olive oil. It is mentioned as an offering (Leviticus 2, 1-14; Ecclesiasticus 9, 7). It also represented a sign of purity and benediction for the serene man. Olive oil was considered to be not only an essential element in the diet, but also an unguent that perfumed the body, fortified the limbs and soothed wounds.

Catholicism has maintained traces of these symbolic gestures. They can definitely be linked to the therapeutic measures of antiquity, which were also used in oriental therapy, and were documented by the writings of Greek physicians.

Olive oil is still used at baptism, to anoint the new born; at confirmation, when the child is growing strong; and for extreme unction, when the person who is dying can be comforted. In this last case, the oil is a link between the divine and the human, between earthly death and eternal life. Pouring oil upon the head means to augur joy, love and peace; but it is also a sign of passage: birth to life or to another sphere. It is also the symbol of consecration for priests and represents the investiture with divine light. For many years, when the Kings of France wished to be raised to the rank of sovereign, through consecration "bestowing divine right", they were anointed while making reference to the "Holy Chrism" of the Bible (Exodus 30, 22-23). In these ceremonies, the passage from one condition to another symbolized the additional responsibility of the person in power who had to represent God - who is justice and love.

But the most representative symbol of oil has been the lamp. Olive oil became the source of light for most of the populations of the ancient Mediterranean; the lamp which irradiated this light inspired sacred and non-sacred texts in all countries.
In both the Old and New Testaments there are numerous references to the lamp, which is identified with wisdom: it enables one to enter the kingdom of God and to remain in the light (Matthew 25, 1-13). In the Old Testament, the light from the candelabra of the seven lamps refers to the king and to the high priests who must illuminate the populace and lead it along the road to salvation. And lastly, the light that burns close to the altar in the Catholic church represents the immense and reciprocal love between God and man (Mastrangelo, 1982).

Reference to the lamp is also found in the Koran (XXIV, 35) and in the Kabylia. In those passages where links to the ancient traditions are strongest, reference to the lamp is to be found in all phases of the life of man:

- *the lamp of birth*: when a child is born, the lamp is kept alight for seven days, until the child is presented in the sanctuary. The lamp symbolizes the

Photo 6.
The Minoan palace at Knossos (Crete). Small clay amphoras for olive oil and big anaphors for the cereal conservation.

presence of the soul, newly incarnate, in the body;

- *the lamp of marriage*: when the bride arrives at the bridegroom's house, the "wise woman" carries a lamp, which symbolizes fecundity;

- *the lamp of ploughing*: on the day of ploughing, the woman accompanies her husband to the fields and brings a lamp, fruit, cereals and vegetables, which will be offered to the children. Also, in this case, the metaphor with fecundity is clear. This rite brings to mind, in a surprising manner, the ancient Eleusinian rituals;

- *the lamp of death*: it is present in every "sanctuary", and lights the day of the pilgrim. This type of lamp is a symbol of one of the most widely used Muslim traditions, dating back into antiquity (Verdié, 1990).

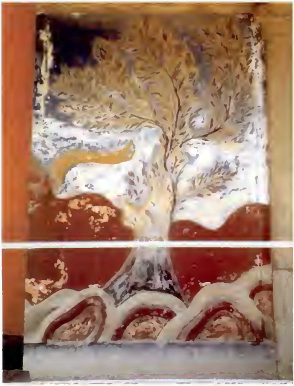

Photo 7. The Minoan palace at Knossos (Crete). A fresco of an olive tree.

Conclusions

The olive tree (*Olea europaea* L.) is a typical Mediterranean plant but the "when" and "why" it was first cultivated appear to have been lost in the mists of antiquity.

Due to its longevity, the olive tree has accumulated a considerable history and has entered the myths, legends and religions of the many civilizations that have developed in the Mediterranean basin. The widespread diffusion of this plant and, consequently, the use of its products (fruits, oil, wood and leaves) serve to emphasize the importance that this species has occupied in the economies of many countries.

The olive has been the subject of study by many botanists and agronomists. They have contributed to establishing a comprehensive understanding of the species. In particular, they have collected data on ancestral forms which may explain the origins of the plant, and information on the relationships which exist between the cultivated and wild olive species.

Through a bibliographic analysis of the species *Olea europaea* L., it has been possible to synthesize, to some extent, the numerous works and references which exist on the subject. A systematic arrangement of the available data on the olive tree was therefore attempted, primarily concerning its classification, origins, diffusion and place in history.

Due to the long history of the cultivation of the plant, the amount of information available on the subject is enormous and the results of this study have shown that, even today, after years of study and research, many authors do not agree on some interpretations of basic data. The geographical origin of the species and the taxonomic status of the subspecies *sativa* and *sylvestris* are among these controversial topics awaiting a final resolution.

The cultivated olive, *O.europaea* L. subsp.*sativa* Hoffm. et Link, is of current importance due to its numerous commercial uses and its increasing environmental role in today's world such as hydrogeology, establishment on marginal land, landscaping, etc. This plant therefore continues to merit serious and comprehensive research by those countries that are involved in its cultivation.

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Tables

Table 1.

List of genera in the family *Oleaceae* (19th century authors)

De Candolle, 1883	De Grully, and Viala, 1886	Flahault, 1886	Knoblauch, 1891
Boaria	*Aryma*	*Chionanthus*	*Aryma*
Chionanthus	*Ceranthus*	*Fontanesia*	*Ceranthus*
Fontanesia	*Chionantus*	*Forestiera*	*Chionanthus*
Forsythia	*Dobera*	*Forsythia*	*Dobera*
Fraxinus	*Fontanesia*	*Fraxinus*	*Fontanesia*
Kellaua	*Forestiera*	*Hesperelaea*	*Forestiera*
Ligustrum	*Forsythia*	*Jasminum*	*Forsythia*
Linociera	*Fraxinus*	*Ligustrum*	*Fraxinus*
Mayepea	*Hesperelaea*	*Mayepea*	*Jasminum*
Myxopyrum	*Jasminum*	*Menodora*	*Ligustrum*
Nathusia	*Ligustrum*	*Myxopyrum*	*Linociera*
Noronhia	*Linociera*	*Nathusia*	*Myxopyrum*
Notelaea	*Myxopyrum*	*Noronhia*	*Noronhia*
Olea	*Noronhia*	*Notelaea*	*Notelaea*
Osmanthus	*Notelaea*	*Nyctanthes*	*Olea*
Phillyrea	*Olea*	*Olea*	*Osmanthus*
Piconia	*Osmanthus*	*Osmanthus*	*Phillyrea*
Stereoderma	*Phillyrea*	*Phillyrea*	*Salvadora*
Syringa	*Salvadora*	*Syringa*	*Schrebera*
Tetrapilus	*Schrebera*	*Tessarandra*	*Syringa*
Visiania	*Syringa*		
n – number of genera			
n. 21	n. 21	n. 20	n. 20

Table 2.

List of genera in the family *Oleaceae* (20th century authors)

Bailey, 1964	Engler, 1964	Hutchinson, 1969	Cronquist, 1981
Chionanthus	*Abeliophyllum*	*Bolivaria*	*Chionanthus*
Fontanesia	*Amorolea*	*Forestiera*	*Forestiera*
Forsythia	*Chionanthus*	*Fraxinus*	*Forsythia*
Fraxinus	*Comoranthus*	*Jasminum*	*Fraxinus*
Jasminum	*Fontanesia*	*Jasminum*	*Hesperelaea*
Ligustrum	*Forestiera*	*Syringa*	*Jasminum*
Olea	*Forsythia*		*Ligustrum*
Osmanthus	*Fraxinus*		*Linociera*
Siphonosmantus	*Jasminum*		*Noronhia*
Syringa	*Ligustrum*		*Olea*
	Linociera		*Osmanthus*
	Menodora		*Syringa*
	Myxopyrum		*Tessarandra*
	Noronhia		
	Olea		
	Osmanthus		
	Phillyrea		
	Piconia		
	Schrebera		
	Siphonosmantus		
	Syringa		
n.= number of genera			
n. 10	n. 21	n. 6	n. 13

Table 3.

Classification of the family *Oleaceae* (Greuter *et al.*, 1989).

Genus	*Species*	*Synonyms*	*Subspecies*
Fontanesia Labill.	*F.phillyraeoides* Labill.		
Forsythia Vahl.	*F.europaea* Degen et Bald.		
Fraxinus L.	*F.angustifolia* Vahl.	= *F.angustifolia*	Subsp.*pannonica* Soó et Simon
		= *F.australis* (Camb.) Gay	
		= ? *F.millelacuum* C.Koch	
		= *F.numidica* Dippel	
		= *F.oxycarpa* Willd.	
		= *F.oxyphylla* M.B.	
		= *F.oxyphylla*	subsp.*angustifolia* (Vahl) P.Fourn.
		= *F.oxyphylla*	subsp.*oxycarpa* (Willd) P.Fourn.
		= *F.oxyphylla*	subsp.*parvifolia* (Lam.) P.Fourn.
		= *F.parvifolia* Lam.	
		= *F.rostrata* Guss.	
		= *F.rotundifolia* Miller	subsp. *angustifolia* subsp.*oxycarpa* (Willd.) Franco, Rocha
		= *F.rotundifolia*	subsp.*oxycarpa* (Willd) P.Green subsp.*syriaca* (Boiss.) Yalt.
		= *F.rotundifolia*	subsp.*syriaca* (Boiss.) P.Green
		= *F.syriaca* (Boiss.) Diagn.	
	F.dimorpha Cosson et Durieu	- "*F.xanthoxyloides*"	
	F.excelsior L		subsp.*coriariifolia* (Scheele) E.Murray
		= *F.coriariifolia* Scheele	subsp.*excelsior*
	F.ornus L.	= *F.argentea* Loisel.	
		= *F.cilicica* Lingesh	
		= *F.europaea* Pers.	subsp.*cilicica* (Lingelsh.) Yalt
		= *F.ornus*	subsp.*rotundifolia* (Ten.) Nyman
		= *F.rotundifolia* Lam.	
	F.pallisae Wilmott		
Jasminum L.	*J.fruticans* L.	= *J.syriacum* Boiss.et Gaill.	
	J.officinale L.		
Ligustrum L.	*L.ovalifolium* Hassk.		

Genus	*Species*	*Synonyms*	*Subspecies*
	L.vulgare L.	= *L.vulgare*	subsp. *italicum* (Miller) Fukarek
Olea L.	*O.europaea* L.	= *O.europaea*	subsp. *sativa* (Loudon) Arcangeli
		= *O.europaea*	subsp. *sylvestris* (Miller) Hegi
		= *O.oleaster* Hoffm.et Link	
		= *O.sativa* Hoffm. et Link	subsp. *oleaster* (Hoffm. et Link) Negodi
		= *O.sylvestris* Miller	
	O.indica Burm. *O.laperrini* Batt. et Trabut *O.maroccana* Greuter et Burdet	= *O.salicifolia* Barbero et al.	
Osmanthus Lour.	*O.decorus* (Boiss. et Balansa) Kasapligil	= *O.decora* Boiss. et Balansa	
		= *O.vilmoriniana* Boiss et Balansa	
Phillyrea L.	*P.angustifolia* L.	= *P.rosmarinifolia* Miller	
	P.latifolia L.	= *P.angustifolia*	subsp. *latifolia* (L.) Maire
		= *P.angustifolia*	subsp. *media* (L.) Bon. et Layens
		= *P.buxifolia* (Aiton) Link	
		= *P.cordifolia* Sennen	
		= *P.ilicifolia* Willd.	
		= *P.laevis* (Aiton) Willd.	
		= *P.latifolia*	subsp. *media* (L.) P.Fourn.
		= *P.latifolia*	subsp. *orientalis* Sebastian
		= *P.ligustrifolia* L.	
		= *P.media* L.	
		= *P.medianifolia*	subsp. *caballeroi* Sennen
		= *P.obliqua* (Aiton) Willd	
		= *P.spinosa* Miller	
		= *P.stricta* Bertol.	
		= *P.virgata* Willd.	
Syringa L.	*S.vulgaris* L.		

Table 4.

List of genera in the family *Oleaceae* as cited by several authors (1883-1981).

(De Candolle, 1883; Flahault, 1886; De Grully, Viala, 1886; Knoblauch, 1891; Fiori, 1923-1929; Bailey, 1964; Engler, 1964; Hutchinson, 1969; Tutin *et al.*, 1972; Zàngheri, 1976; Cronquist, 1981; Pignatti, 1982; Several Authors, 1981).

Abeliophyllum
Arymа
Boaria
Amarolea
Ceranthus
Chionanthus
Comoranthus
Dobera
Fontanesia
Forestiera
Forsythia
Fraxinus
Gymnelaea
Haenianthus
Hesperelaea
Jasminum
Ligustrum
Linociera
Mayepea
Menodora
Myxopyrum
Nathusia
Noronhia
Noldeanthus
Notelaea
Nyctanthes
Olea
Osmanthus
Phillyrea
Piconia
Salvadora
Schrebera
Siphonosmantus
Stereoderma
Syringa
Tessarandra
Tetrapilus
Visiania

n.= number of genera = 38

Table 5.

Classification of the genus *Olea* (De Candolle, 1884).

Genus	*Species*	*Synonyms*	*Subspecies*
Olea L.	I *Gymneleae* Endl. (without corolla, hypogeal stamens)		*O.apetala* Vahl.
	II *Euelaea* DC. (corolla and margin quadrifid, stamens at the base of the corolla)	1. Panicles, raceme or axillary corymb	*O.acuminata* Wall. *O.attenuata* Wall.
		Hermaphrodite flowers	*O.chrysophylla* Lam. *O.cuspidata* Wall. *O.dentata* Wall. *O.europaea* L. *O.floribunda* Benth. *O.foveolata* E.Mey. *O.glandulifera* Wall. *O.longifolia* Moluch. *O.obtusifolia* Lam. *O.oleaster* DC. *O.roxburghiana* Roem et Schultes *O.salicifolia* Wall. *O.sativa* Hoffm. et Link *O.verrucosa* Link
		Dioecious flowers (through abortion)	*O.americana* L. *O.dioica* Roxb. *O.wightiana* Wall.
		2. Terminal panicles	*O.capensis* L. *O.compacta* Wall. *O.concolor* E.Mey. *O.exasperata* Jacq. *O.heyneana* Wall. *O.humilis* Eckl. *O.lancea* Lam. *O.laurifolia* Lam. *O.lindleyi* Wall. *O.maritima* Wall. *O.microcarpa* Wright *O.nigra* Laisel *O.paniculata* R. Br. *O.pauciflora* Wall.

Table 6.

Classification of the genus *Olea* (Knoblauch, 1891).

Section	*Species*	*Subspecies*
1. *Gymnelaea* Endl.	*O.apetala* Vahl.	
2. *Euelaea* DC.	*O.capensis* L.	
	O.chrysophylla Lam.	
	O.cuspidata Wall.	
	O.dioica Roxb.	
	O.europaea L.	*sativa* ? DC.
		oleaster ? DC.
	O.exasperata Jacq.	
	O.glandulifera Wall.	
	O.lancea Lam.	
	O.laurifolia Lam.	
	O.paniculata R.Br.	
	O.polygama Wrigth	
	O.verrucosa Link	

Table 7.

Geographic distribution of the species of the genus *Olea* (Ciferri, 1942).

Area	*Species*	*Distribution*
Afro-Mediterranean Area	*O.chrysophylla* Lam. *O.excelsa* Aiton *O.guineënsis* Hutch. et Smith *O.hochstetteri* Bak. *O.kilimandscharica* Knobl. *O.laperrini* Batt. et Trab. *O.laurifolia* Lam. *O.Mussolinii* Chiov. *O.schliebenii* Knobl. *O.somaliensis* Baker *O.subtrinervata* Kiov.	(centred on the mountain regions of western Africa, reaching as far South as Tanzania)
Indochina-Malaysia	*O.cuspidata* Wall.	(includes Asia and probably the northern part of Australia)
Natal-Madagascar	*O.capensis* L. *O.concolor* E. Mey. *O.enervensis* Harv. *O.exasperata* Jacq. *O.foveolata* E.Mey. *O.macrocarpa* Wrigth *O.pegleri* Wrigth *O.verrucosa* Link *O.woodiana* Knobl.	(includes southern Africa, the Mauritian and Mascarene islands)

Table 8.

Classification of the species of the genus *Olea* (*Index Kewensis*, 1895-1996).

Species	*Subspecies*	*Synonyms*
O.acuminata Wall. (1885)		
O.ambrensis Perrier (1941-1950)		
O.americana L. (1885)		*O.laeta* Salisb. (1885)
O.apetala Vahl. (1885)		
O.arborea Lodd. (1885)		
O.ardisioides King et Gamble (1906-1910)		
O.attenuata Wall. (1885)		
O.aucheri Ehrend. (1956-1960)		
O.bournei Fyson (1911-1915)		
O.brevipes Chia (1956-1960)		
O.capensis L. (1885)		*O.buxifolia* Miller (1885) *O.cassinifolia* Salisb. (1885)
O.capensis L.	subsp. *hochstetteri* (Backer) I. Friis et P.S. Green (1985-1990)	
O.capitellata Ridley (1906-1910)		
O.caudatilimba Chia (1956-1960)		
O.chimanimani Kupicha (1976-1980)		
O.chrysophylla Lam. (1885)		*O.ferruginea* Hort. (1885)
O.compacta Wall. (1921-1925)		
O.concolor E.Mey. (1885)		
O.cordatulata Li (1941-1950)		
O.cunninghamii Hook. (1885)		
O.cuspidata Wall. (1885)		*O.asiatica* Desf. (1885) *O.ferruginea* Royle (1885)
O.densiflora Li (1941-1950)		
O.dentata Wall. (1885)		*O.salicifolia* Wall. (1885)
O.dioica Roxb. (1885)		*O.heyneana* Wall. (1885) *O.malabarica* Kostel ? (1885) *O.wightiana* Wall. (1885)
O.Endlicheri F.Muell. (1885)		
O.enervis Harv. (1906-1910)		
O.europaea L. (1885)		*O.alba* Lam.(1885) *O.amygdalina* Gouan (1885) *O.angulosa* Gouan (1885) *O.angustifolia* Rafin. (1885) *O.argentata* Clem. (1885) *O.arolensis* Clem. (1885) *O.atrorubens* Gouan (1885) *O.buxifolia* Steud. (1885) *O.cajetana* Petagn. (1885) *O.communis* Steud. (1885) *O.craniomorpha* Gouan (1885) *O.dulcis* Collenette (1985-1990)

Species	*Subspecies*	*Synonyms*
		O.ferruginea Wall. (1885) *O.gallica* Miller (1885) *O.hyspalensis* Clem., ex Steud. (1885) *O.hyspanica* Miller (1885) *O.lancifolia* Moench(1885) *O.longifolia* Steud.(1885) *O.obliqua* Steud.(1885) *O.oblonga* Gouan (1885) *O.odorata* Rozier (1895) *O.officinarum* Crantz (1885) *O.oleaster* Hoffm. et Link (1885) *O.pallida* Salisb.(1885) *O.polymorpha* Risso (1885) *O.praecox* Gouan (1885) *O.racemosa* Gouan (1885) *O.regia* Rozier, ex Roen (1885) *O.sativa* Gaterau (1966-1970) *O.sativa* Hoffm. et Link (1885) *O.sphaerica* Gouan (1885) *O.sylvestris* Miller (1885) *O.variegata* Gouan (1885) *O.verrucosa* Rafin.(1885) *O.viridula* Gouan (1885)
O.europaea L.	subsp. *africana* (Miller) P.S. Green (1976-1980)	
O.europaea L.	subsp. *cerasiformis* (Webb.et Berth) Kunkelesunding (1971-1975)	
O.exasperata Jacq. (1885)		*O.glabella* Herb.Banks, ex Lowe (1885)
O.floribunda Benth. (1885)		
O.fragrans C.P.Thunberg (1936-1940)		
O.foveolata E.Mey. (1885)		
O.gamblei C.B.Clarke (1885)		
O.glandulifera Desf. Cat. (1885)		*O.glandulosa* DC. (1885)
O.graciliflora Koord. et Valet. (1901-1905)		
O.grandiflora Wall. (1921-1925)		
O.guangxiensis B.M.Miao (1981-1985)		
O. Hutch. Et Smith (1931-1935)		
O.hainanensis Li (1941-1950)		
O.heyneana Wall. (1921-1925)		
O.hochstetteri Baker (1901-1905)		
O.humilis Eckl. (1885)		
O.indica Burm. (1966-1970)		
O.kilimandscharica Knobl. (1931-1935)		
O.laevis Stokes (1885)		

Species	*Subspecies*	*Synonyms*
O.laucea Lam. (1885)		*O.exasperata* Willd. (1885)
O.lanceolata Hook. (1885)		
O.laperrini Battand. et Trab. (1911-1915)		
O.laurifolia Lam. (1885)		*O.intermedia* Tausch (1895) *O.undulata* Jacq. (1885)
O.laxiflora Li (1941-1950)		
O.lindleyi Wall. (1921-1925)		
O.listeriana Sim., ex Lister (1906-1910)		
O.lorentii Hochst. (1885)		
O.mackenii Harv. (1906-1910)		
O.macrocarpa Wrigth (1906-1910)		
O.macrophylla Baker (1885)		
O.macrophylla Gagnep. (1931-1935)		*O.Gagnepainii* Knobl. (1931-1935)
O.madagascariensis Boiv. (1941-1950)		
O.maritima Wall. (1886-1895)		*O.Javanica* Knobl. (1886-1895)
O.maritima Wall. (1885)		*O.depauperata* Steud. (1885)
O.maroccana Greuter et Burdet (1985-1990)		
O.microcarpa Vahl (1885)		*O.rigida* Hort. Cels, ex Steud. (1885)
O.montana Hook. (1885)		
O.monticola Gandoger (1916-1920)		
O.Mussolinii Chiov. (1936-1940)		
O.myrtifolia Wall. (1885)		
O.neriifolia Li (1941-1950)		
O.nigra Loisel. (1885)		
O.oblanceolata Craib (1916-1920)		
O.obovata Baker (1885)		
O.obtusifolia Lam. (1885)		*O.cernua* Vahl (1885)
O.ovalis Miq. (1885)		
O.palawanesis Kiew (1993)		
O.paniculata R.Br. (1885)		
O.paniculata Roxb. (1931-1935)		
O.parvilimba Merr.et Chun(1992)		
O.pauciflora Wall. (1921-1925)		
O.pegleri Wright (1906-1910)		
O.penangiana Ridley (1916-1920)		
O.perrieri Cheval. (1941-1950)		
O.Pervilleana Knobl.(1931-1935)		
O.platycarpa King et Gamble (1906-1910)		
O.polygama Wight (1885)		*O.Gardneri* Thw. (1885)
O.puberula Ridley (1911-1915)		
O.rosea Kraib ex Hossens (1911-1915)		
O.salicifolia M.Barbero (1985-1990)		
O.salicifolia Wall (1921-1925)		

Species	*Subspecies*	*Synonyms*
O.Schimperi Gandoger (1916-1920)		
O.schliebenii Knobl.(1931-1935)		
O.sinensis Hort. Ex Lavallée (1921-1925)		
O.somaliensis Baker (1901-1905)		
O.subtrinervata Chiov.(1936-1940)		
O.tetragonoclada Chia (1956-1960)		
O.Thozetii Panch.et Sebert (1885)		*O.glandulosa* Panch.(1911-1915)
O.tsoongii Merr. (1995)		
O.verrucosa Link (1885)		*O.africana* Miller (1885) *O.europaea* Thunb. (1885) *O.similis* Burch. (1885)
O.vitiensis Sem. (1885)		
O.welwitschii Gilg et Schell. (1911-1915)		
O.Wightiana Wall. (1921-1925)		
O.Woodiana Knobl. (1886-1895)		
O.yuennanensis Hand.(1936-1940)		

Table 9.

Geographic distribution of the species of the genus *Olea* (Caruso, 1883).

AFRICA		
	O.capensis L.	Cape of Good Hope (Tahulari mountain)
	O.concolor E.Mey.	Cape of Good Hope (on the mountains)
	O.chrysophylla Lam.	Abyssinia, Reunion islands
	O.europaea L.	Egypt, Tunisia, Algeria, Morocco, Canaries
	O.exasperata Willd.	Cape of Good Hope (on the clayey hills)
	O.foveolata E.Mey.	Cape of Good Hope (in the woods)
	O.humilis Eckl.	Cape of Good Hope (on the dunes)
	O.lancea Lam.	Mauritius and Reunion islands
	O.laurifolia Lam.	Abyssinia
	O.obtusifolia Lam.	Madagascar and Mauritius islands
	O.verrucosa Link	Cape of Good Hope (Tabulari mountain)
	O.verrucosa var. *brachybotrys* DC.	Cape of Good Hope (Mooyplats mountains)
AMERICA		
	O.americana L.	North America
	O.europaea L.	Central America
	O.floribunda Benth.	
ASIA		
	O.acuminata Wall. (longifolia)	Sirmore and Kamaen provinces, East India
	O.acuminata Wall.	Nepal, North India
	O.attenuata Wall.	Burma (near Martahan)
	O.compacta Wall.	Sirmore and Kamaen provinces, East India
	O.cuspidata Wall.	Afghanistan and East India
	O.dentata Wall.	Burma (near Amherst)
	O.dioica Roxb.	Bengal (Sylhet province)
	O.dioica var. *wightiana* Wall.	Bengal (Sylhet province)
	O.europaea L.	Asia minor, North Syria, Kurdistan, North Iran, South Caspian sea, South-East Arabia
	O.glandulifera Wall.	Nepal, North India
	O.heyneana Wall.	East coast of India
	O.lindleyi Wall.	Bengal (Sylhet province)
	O.maritima Wall.	Malacca islands
	O.microcarpa Wall.	Viet Nam
	O.pauciflora Wall.	Penang island (Malacca Strait)
	O.roxburghiana Roem. et Schultes	East coast of India
	O.salicifolia Wall.	Bengal (Sylhet province)
EUROPE		
	O.europaea L.	Mediterranean sea (coastal areas)
OCEANIA		
	O.apetala Wall.	New Zealand
	O.europaea L.	South Australia and Java
	O.paniculata Roxb.	Australia

Table 10.

Geographic distribution of the species *Olea europaea* L. (Grisebach in: De Grully *et al.*1886).

I	Division	Azores, Canary and Madeira islands
II	Division	Atlantic-Mediterranean: Iberian peninsula, France, Italy, Turkey, Greece, southern part of the Black Sea, coasts of Anatolia, Syria, Egypt and Algeria.
III	Division	South-east Asia, limited to the North of the Caucasus and the Caspian Sea and South of the Himalayas.
IV	Division	Sahara and North of the Sahara.

Table 11.

Morpho-ecological classification of *Olea europaea sativa* L. (Breviglieri and Ciferri, 1942).

Species	*Subspecies*	*Variety*
Olea europaea L.	*euromediterranea*	*sativa* series *oleaster* series
	laperrini	*cynnaica* *maircana* *typica*
	cuspidata	

Table 12.

Morpho-agronomic characteristics of the wild olive (Caruso, 1883; Morettini, 1959).

Division I	Oleaster	Group I	Typical wild plant with small drupes that are not very succulent, shrub or tree 3-5 m high.
Division II	Olivastro	Group II	Obtained from the seed of cultivated olives. With medium-sized drupes that are not very succulent.
		Group III	"Mezzani" olives, with less "rustic" and more succulent drupes.
		Group IV	"Frantoiani"; cultivated olives with medium-sized drupes that are very succulent and contain oil.

Table 13.

Chronology of archaeological discoveries and historical records illustrating the probable diffusion of the olive tree.

Unknown	"Iranoturaniana" region (Middle-East)
10000-5000 BC	Paleolithic or Neolithic Age; archaeological discovery of wild olive tree remains; Cyprus
6000 BC	Caucasus, Iran
3700-3500 BC	Palestine
3500 BC	Island of Crete, Greece
3000 BC	Syria
3000-1500 BC	Cyclades Islands, Lebanon: archaeological discovery of seeds at Biblos
XXI-XV centuries BC	Anatolia, Egypt
XVI-XV centuries BC	Cyprus (Phoenicians) and islands of Asia Minor
XVI-VI centuries BC	Islands of the Aegean (Phoenicians, Greeks)
XV century BC	Syria, Palestine, Anatolia
XIV-XII centuries BC	Greece (Attica, Thessaly, Epirus)
XIV-XII centuries BC	Libya, Tunisia (Phoenicians)
VIII-VII centuries BC	Libya (Greeks)
VII-VI centuries BC	Italy (pre-Roman era)
II-III centuries AD	Rapid development of the olive tree in Italy
VII century AD	Sicily, Campania, Lazio (Sabina), Marche, Veneto, Friuli Venezia Giulia, Liguria, Istria
600 AD	France (Gaul: Marseille, Valley of the Rhône) Iberian Peninsula (Phoenicians, Romans, Arabs)
1556 AD	Argentina
1560 AD	Peru, Chile, Antilles, Panama, Brazil
1697 AD	Mexico
1769 AD	California
XX century AD	Australia, New Zealand, Japan, South Africa, India, Pakistan,etc.

Table 14.

List of names used for the cultivated olive tree (*O.europaea* L. subsp. *sativa* Hoffm. et Link) in various languages and countries.

Name	Language and/or Country	Reference
ACEITUNO	(*Spanish*) Spain	Coutance, 1877
ALEVABAGMS	(*Gothic*) Germany	Caruso, 1883
ALLYWÚ KÁLNA	Lithuania	Caruso, 1883
ALLYWÛ MEDIS	Lithuania	Caruso, 1883
AMII	Algeria	Amamou, 1988
AULIVA	Italy	Benigni *et al.*, 1962
AZEMMOUR	Algeria	Verdier, 1909
AZEMMUR	(*Berber*) Sahara	Camps-Fabrer, 1953
AZEMOUR	Algeria	Amamou, 1988
BERRI	Morocco	Ist.Int.Agr.Cong.1939
CHEJERET ZITOUN	Morocco	Amamou, 1988
CHJAR EZ-ZITOUN	(*Arabic)*	Amamou, 1988
CRAAN OLA	(*Celtic*) Ireland	Caruso, 1883
DARAKHAT ZITOUN	(*Persian*)	Amamou, 1988
DRZEWO OLIWNE	Poland	Caruso, 1883
ELAIA	*(Ancient Greek*) Greece	De Candolle, 1883
ELAIWA	*(Mycenaean-Greek)* Crete	
ELEBÉAM	(*Anglo-Saxon)* England	Caruso, 1883
ELIA	Greece (*Modern Greek*)	Caruso, 1883
ELJES KOHKS	Latvian	Caruso, 1883
JAIT	(*Marathi*) India	Caruso, 1883
JAITÀN	(*Gujerati*) India	Caruso, 1883
JAITUN	(*Bengalese*) India	Caruso, 1883
JAITUNA	(*Sanskrit*) India	Caruso, 1883
JALPÂI	(*Hindi*) India	Caruso, 1883
LIVA	Italy	Benigni *et al.*, 1962
MÁSLIC'INA	Russia	Caruso, 1883
MASLINA	(*Old-Slavonic, Slavic*) Bulgaria, Serbia	Caruso, 1883
MÁSLINA	Russia	Caruso, 1883
MASLINICA	(*Old-Slavonic, Slavic*)	Caruso, 1883
MASLINU	(*Wallacchian*) Romania	Caruso, 1883
OELBAUM	Germany	Caruso, 1883
OLAJFA	Hungary	Caruso, 1883
ÖLBAUM	Germany	Caruso, 1883
OLBOUM	(*Old German*) Germany	Caruso, 1883
OLEA	(*Latin*)	
OLEA EUROPAEA SATIVA	(*Latin*)	Linnaeus, 1764
OLEVÉZEN	(*Breton*) France	Caruso, 1883
OLEWYDDEN	(*Welsh*) Wales	Caruso, 1883
OLIA	Italy	Benigni *et al.*, 1962
OLIBOUM	(*Old German*) Germany	Caruso, 1883
OLIE-TROE	Denmark	Caruso, 1883

Name	Language and/or Country	Reference
OLIJFBOOM	Netherlands	Caruso, 1883
OLIV-MARAM	(*Tamil*) India, Sri Lanka	Caruso, 1883
OLIVA	(*Latin*)	
OLIVAO	(*Basque)* Spain	Caruso, 1883
OLIVATRE	(*Ancient languages* of North Europe)	Caruso, 1883
OLIVE TREE	(*English*)	Caruso, 1883
OLIVEBAUM	(*German*)	Benigni *et al.*, 1962
OLIVEIRA	Portugal, Spain	Coutance, 1877
OLIVENBAUM	Germany	Caruso, 1883
OLIVER	(*Latin, French*) France, Switzerland	Caruso, 1883; Benigni *et al.*, 1962
OLIVERA	(*Spanish*) Spain	Caruso, 1883
OLIVIER	(*French*) France	Caruso, 1883
OLIVIER CULTIVÉ	(*French*) France	Coutance, 1877
OLIVIO	Spain	De Candolle, 1883
OLIVIPUU	Finlan	Caruso, 1883
OLÌVKOVOIE DIÈREVO	Russia	Benigni *et al.*, 1962
OLIVO	(*Italian*) Italy	Caruso, 1883
OLIVUS	(*Greek*) Greece	
OLIWA	Bohemia, Poland, Slovakia	Caruso, 1883
OLJE-TRÄD	Sweden	Caruso, 1883
OLJO MUORA	Lapland	Caruso, 1883
ÖLJYPUU	Finland	Caruso, 1883
ÖLLIMÄE	Esthonia	Caruso, 1883
OULIKA	(*Serbian*) Serbia	Amamou,1988
OULIO	France	Amamou,1988
PUMÈR D'OLIVAS	Switzerland	Caruso, 1883
RAMOLIVA	Italy	Benigni *et al.*, 1962
SAIT	(*Semitic, Hebrew*) Israel	Coutance, 1877; De Candolle 1883
SEITUN	(*Touranienne*),Ukraine, Iran, Turkey	De Candolle, 1883
SJETUN	(*Arabic*)	De Candolle, 1883
TAHATIMT	Algeria	Amamou,1988
TAMAHINET	(*Tuareg*) Sahara	De Candolle, 1883
TAS	(*Berber*) Sahara	De Candolle, 1883
TASETTHA	(*Berber*) Sahara	De Candolle, 1883
TAT	(*Old Egyptian*) Egypt	De Candolle, 1883
TAZ	(*Berber*) Sahara	De Candolle, 1883
TAZEMMOURT	(*Berber*) Sahara	De Candolle, 1883
TERMITE	Italy	Benigni *et al.*, 1962
TESELTA	Algeria	Amamou, 1988
TUSUTU AGHULAN	(*Mongolian*) Mongolia	Caruso, 1883
UEIVE	Italy	Benigni *et al.*, 1962
UIVO	Italy	Benigni *et al.*, 1962
ULI	(*Albanian*) Albania	Caruso, 1883
ULIJKA	(*Serbian*) Serbia	Caruso, 1883
ULIVA-CETTU	(*Telinghiani*) India	Caruso, 1883

Name	Language and/or Country	Reference
ULIVO	(*Italian*) Italy	Caruso, 1883
ULLÎ	(*Albanian*) Albania	Amamou, 1988
ULLIRI	(*Albanian*) Albania	
ULU	*Semitic*	Bosi, 1994
ULUSUN MOO	(*Mangese*) Manchuria	Caruso, 1883
UPON UNDUS	(*Daiacco*) Borneo	Caruso, 1883
WOLIJOWNJA	(*Vendico*) Serbia	Caruso, 1883
YOU GAN LA	China	
ZAIT	(*Hebrew, Semitic*) Israel, Iran	Coutance, 1877
ZAITHO	Syria	Caruso, 1883
ZAITUM	(*Arabic*)	Caruso, 1883
ZAITÛN	(*Arabic*), (*Hindi*) India	Caruso, 1883
ZAYIT	(*Hebrew*)	Amamou,1988
ZAYT	Ethiopia	Caruso, 1883
ZAYTH	(*Hebrew*) Israel	Caruso, 1883
ZEITAN	Java, Malaysia, New Guinea	Caruso, 1883
ZEITÛN	(*Arabic*), Turkey	De Candolle, 1883
ZEITÛN AGHADJI	(*Turkish*), Turkey	Amamou,1988
ZEMMOUR	(*Berber*) Sahara	De Candolle, 1883
ZERHOUN	Morocco	Anonym
ZERTUM	(*Turkish*), Turkey	
ZÉTÂ	(*Chaldean*) Iran, Iraq	Caruso, 1883
ZETHI	Georgia - Russia	Caruso, 1883
ZEYTIN AGACI	(*Turkish*) Turkey	
ZEYTOUNE	(*Arabic*)	Benigni *et al.*, 1962
ZITOUN	Algeria, Libya, Morocco, Tunisia	De Candolle, 1883
ZITOUNA	Tunisia	Amamou,1988

Table 15.

List of names used for the wild olive tree (*Olea europaea* L. subsp. *sylvestris* Miller) in various languages and countries.

Name	Language and/or Country	Reference
ACEBUCHE	Portugal, Spain	Caruso,1883; Souza da Camara,1905
AGHRIÈSLIES	Turkey	Lacaze, 1909
AGRIDDU	Italy	Benigni *et al.*, 1962
AGRIÉLAJA	Greece	Tavanti, 1819; Morettini, 1950
ALEO	Algeria	Camps-Fabrer, 1953
AZEBUCHE	Spain	Coutance, 1877; De Candolle,1883;
AZEMMUR	Morocco	Camps-Fabrer, 1953
AZEYSTUNO	Spain	Tavanti, 1819
BORDE	Spain	Patac *et al.*, 1954
BORDIZO	Spain	Ruby, 1913
BRAVA	Portugal	Souza da Camara, 1905
DELICE	Turkey	
KOTINOS	Greece	Tavanti, 1819
OLAY-FA	Hungary	Tavanti, 1819
OLEA EUROPAEA SYLVESTRIS	(*Latin*)	Linnaeus,1764; De Candolle, 1883
OLEASTER	(*Latin*)	De Candolle, 1883; Morettini, 1950
OLEASTRO	(*Italian*) Italy	Tavanti, 1819; Morettini, 1950
OLIJF-BOOM	Belgium	Tavanti, 1819
OLIVASTRO	(*Italian*) Italy	Tavanti, 1819; Souza da Camara 1905; Morettini,1950
OLIVE-TREE	(*English*)	Tavanti, 1819
OLIVEIRA	Portugal	Benigni *et al.*, 1962
OLIVEIRA BRAVA	Portugal	Benigni *et al.*, 1962
OLIVERA BARDA	*(Catalan)* Spain	Morettini, 1950
OLIVERA BORDA	*(Catalan)* Spain	Caruso, 1883
OLIVIEN	Germany	Tavanti, 1819
OLIVIER SAUVAGE	(*French*) France	Coutance,1877; Ruby, 1917
OLIVO SELVATICO	(*Italian*) Italy	Souza da Camara 1905; Morettini,1950
OLIVO SILVESTRE	Spain	Ruby, 1913
OLLASTRE	Portugal	Souza da Camara, 1905
OLLASTRU	Italy	Benigni *et al.*, 1962
OUILLASTRE	France	Ruby, 1917
OULIVIÈ FÉ	France	Ruby, 1913, 1917
POGNORIS	France	Benigni *et al.*, 1962

Name	Language and/or Country	Reference
TAÏCHET	Algeria	Amamou, 1988
TAS	(*Berber*) Sahara	De Candolle, 1883
TASELTASSET	Algeria	Amamou, 1988
TAT	(*Old Egyptian*) Egypt	De Candolle, 1883
TAZ	(*Berber*) Sahara	De Candolle, 1883
TAZEBBOUIT	(*Berber*) Sahara	De Candolle, 1883
TAZEBUJT	(*Berber*) Sahara	De Candolle, 1883
TESETTHA	(*Berber*) Sahara	De Candolle, 1883
ZAG ET TER	Libya	Benigni *et al.*, 1962
ZAIBOUCH	Tunisia	Campbell, 1912
ZAIT	Iran	Caruso, 1883
ZAITHO	Syria	Caruso, 1883
ZAMBUGEIRO	Portugal	Coutance, 1877
ZAMBUJEIRO	Portugal	Souza da Camara, 1905
ZAMBUJO	Portugal	Souza da Camara, 1905
ZAMBULHO	Portugal	Souza da Camara, 1905
ZAYT	Ethiopia	Caruso, 1883
ZAYTH	(*Hebrew*) Israel	Caruso, 1883
ZEBBOUJ	(*Berber*) Sahara, Algeria, Morocco	De Candolle, 1883
ZEBBOUZ	Tunisia	Campbell, 1912
ZEBBŪG	(*Arabic*)	Benigni *et al.*, 1962
ZEBBUZ	Algeria, Libya, Morocco	Camps-Fabrer, 1953
ZEBOUDJ	Algeria	Verdier, 1909
ZEBOUZ	Tunisia	Degrully, 1907
ZEMBOUDGE	Algeria	Coutance, 1877
ZENBOUDJE	Algeria	De Candolle, 1883
ZÉTÂ	(*Chaldean*) Iran, Iraq	Caruso, 1883
ZEYTIN RENGINDE	(*Turkish*) Turkey	

Table 16.

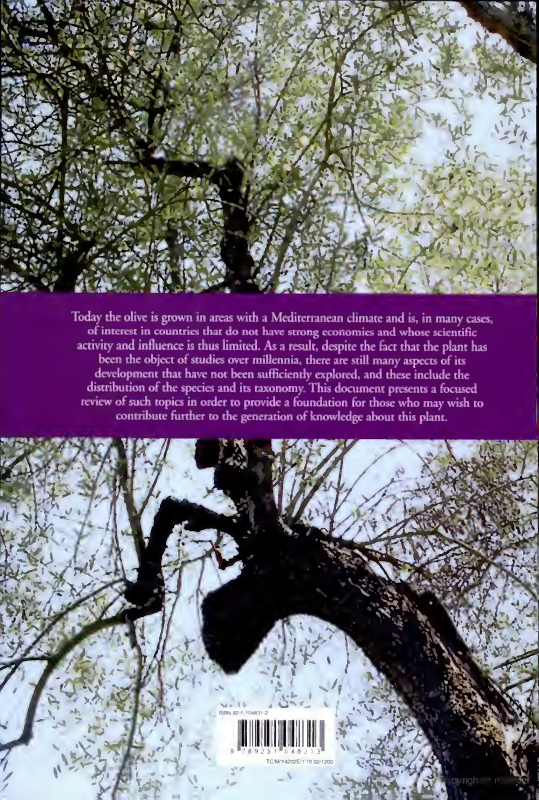
List of names used for olive oil in various languages and countries.

Name	Language and/or Country	Reference
ACEITE	(*Spanish*) Spain	Coutance, 1877
ELAION	(*Ancient Greek*) Greece	
ELAIWON	(*Mycenaean-Greek*) Crete	
ELEIVANA	(*Etruscan*) Italy	Forni, 1990
GAN LA YOU	China	
HUILE	(*French*) France	
LADHI	(*Greek*) Greece	
MASLO	(*Slavonic*)	Caruso, 1883
OLEO	(*Portuguese*) Portugal	
OLEUM	*Latin*	
OLIO	(*Italian*) Italy	
OLIUM	*Latin*	
OLIVE OIL	(*English*)	
OLIVENÖL	Germany	
OLIVUM	*Latin*	
RAUGHAN I ZAIT	Iran	Caruso, 1883
ROUGHAN-E ZEITUN	Iran	
SEIT	(*Arabic, Hebrew*)	Coutance, 1877
TOSUN	Mongolia	Caruso, 1883
TZÊTH	Armenia, India	Caruso, 1883
ZAIT	Iran	Caruso, 1883
ZAYT	(*Arabic*)	Caruso, 1883
ZAYTH	(*Hebrew*)	Caruso, 1883
ZAYTO	Syria	Caruso, 1883
ZEIT	(*Arabic, Hebrew*)	De Candolle, 1883
ZÉTÂ	(*Chaldean*)	Caruso, 1883
ZEYTINAGI	(*Turkish*) Turkey	
ZIT	Algeria, Morocco, Tunisia	Camps-Fahrer, 1953

Table 17.

List of names used for the olive fruit in various languages and countries.

Name	Language and/or Country	Reference
ACEITUNA	(*Spanish*) Spain	
ELAIA	(*Ancient Greek*) Greece	
ELAIWA	*(Mycenaean-Greek)* Crete	
ELIÀ	*(Greek)* Greece	
MIVAH-E ZEITUN	Iran	
OLEA	*(Latin)*	
OLIVA	*(Latin)*	
OLIVA	*(Italian)* Italy	
OLIVE	(*French*) France	
OLIVERA	(*Spanish*) Spain	
ZEYTIN	(*Turkish*) Turkey	



Today the olive is grown in areas with a Mediterranean climate and is, in many cases, of interest in countries that do not have strong economies and whose scientific activity and influence is thus limited. As a result, despite the fact that the plant has been the object of studies over millennia, there are still many aspects of its development that have not been sufficiently explored, and these include the distribution of the species and its taxonomy. This document presents a focused review of such topics in order to provide a foundation for those who may wish to contribute further to the generation of knowledge about this plant.

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